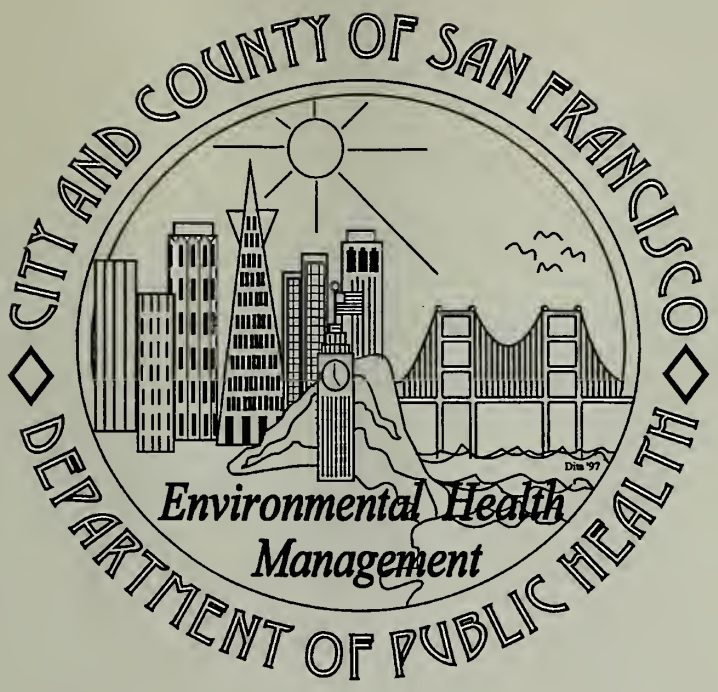

San Francisco Childhood Lead Prevention Program
Data Evaluation
1991-1997

Surveillance Data Analysis by Haroon Ahmad, M.P.H.
Senior Research Associate, CLPP

Environmental Data Analysis by Christine Martin, M.P.H.
Senior Research Associate, CLPP

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Sincerely,

Karen Cohn
Program Manager

to support the CLPP and DPH staff in their efforts to protect our children from lead.

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City and County of San Francisco

Department of Public Health
Childhood Lead Prevention Program
Bureau of Environmental Health Management
1390 Market Street, Suite 230
San Francisco, CA 94102
Phone (415) 554-8930
Fax (415) 554-8938

April 16, 1998

Dear Executive Director,

Enclosed is a copy of the San Francisco Childhood Lead Prevention Program (CLPP) Data Evaluation Report which presents the findings of a comprehensive analysis of blood lead screening/surveillance and environmental data captured by the Department of Public Health (DPH) from 1991 to 1997

Contained within this report are some encouraging findings, such as: 1) blood lead screening in San Francisco has increased every year since the program's inception, and 2) after witnessing an increase of over 100% in case findings from 1991 to 1995, the number of cases decreased significantly for the first time in 1996.

Despite these successes, it would be dangerous to assume that we have solved the problem of childhood lead poisoning in San Francisco for the following reasons:

1) ***The source of the problem still exists because lead is ubiquitous in the environment. Due to our old housing stock, lead-based paint, dust, and soil hazards are especially prevalent in San Francisco.***
2) ***Although screening numbers have increased, a significant number of eligible and high-risk SF children have not been screened.***
3) ***Screening information may be misleading since it only describes a point in time and therefore it is not an accurate picture of past nor future exposure.***
4) ***The percentage of San Francisco children with elevated blood lead levels has remained constant over time (7-8% of SF children tested have blood lead levels greater than the CDC level of concern).***

Our Surveillance staff is available to do an in-house presentation of this report until May 15, 1998. Please contact Mr. Haroon Ahmad, Sr. Research Associate, at 554-8930 ext. 24 to schedule a presentation. We appreciate the work you have done, and we hope you will continue to support the CLPP and DPH staff in their efforts to protect our children from lead.

Sincerely,

Data Analysis Editorial Committee

REF 615.9256 Ah51s

Ahmad, Haroon.

San Francisco childhood
lead prevention program
[1998?]

INTRODUCTION

The San Francisco Department of Public Health (DPH) has regularly collected childhood blood lead screening and surveillance data since 1991. Data collected and analyzed by the DPH has previously been presented in two reports published in the *San Francisco Epidemiologic Bulletin* in 1992 and 1995.

This current report presents the findings of a comprehensive analysis of blood lead screening/surveillance data (1/91-12/96) and environmental data (7/91- 6/97). Analysis and evaluation of this data was conducted in order to:

1. Fulfill the mandates of the Comprehensive Lead Poisoning Prevention Ordinance, as incorporated into San Francisco Health Code, Article 26:

    - *Section 1620: Data Management System:* The Director shall maintain a data management system designed to collect and analyze information regarding elevated blood lead level children, primary prevention and screening activities.

    - *Section 1621: Blood Test Reporting:* Every physician and clinical laboratory shall promptly report all results of blood lead tests to the County Health Officer on forms devised by that Officer and such demographic information as the forms require.

    - *Section 1622: Lead Poisoning Test Reports:* The Director shall prepare a report every six months in language designed to be understood by the general public describing the results of all lead tests obtained by the Department for San Francisco residents, including the test level, age, sex, ethnicity and general area of residence of each case of childhood lead poisoning. The Director shall prepare the report in those languages that he or she deems appropriate in order to communicate the information effectively. (This current report will help create a template for the bi-annual report required by this section).

2. Analyze screening and case finding trends over time.

3. Have a report readily available for data requests received by the staff of the Childhood Lead Prevention Program (CLPP) from the public, other sections of the Health Department, and other city and state agencies.

4. Assist the medical community and the Department of Public Health to develop an effective blood lead screening policy for the City and County of San Francisco.

5. Analyze environmental data to provide evidence of the extent of lead-paint hazards in the City and use this data to promote policy and legislation that reduce sources of lead hazards.

EXECUTIVE SUMMARY

Each year from 1991 through 1996, the San Francisco Childhood Lead Prevention Program (CLPP) has identified approximately 50 to 100 children under six years of age with blood lead levels high enough (≥15μg/dL) to warrant case management services from the Department of Public Health (DPH). Case management services include education of the child's parents/guardians about the sources, effects, and prevention of lead poisoning and nutritional counseling. Children with blood lead levels ≥20μg/dL, or persistent at 15-19μg/dL, also receive an environmental investigation to identify sources of lead in their home.

A total of 460 children received case management services from the DPH from 1991 through 1996. The number of lead-poisoned children (blood lead level ≥15μg/dL) identified in San Francisco peaked in 1995 at 106 children, but dropped significantly in 1996. This decline follows national trends and is suggestive of the fact that extensive education and outreach efforts by the CLPP and community activists have had a positive impact on reducing childhood lead poisoning in San Francisco.

In addition to education and outreach, other factors which we suspect contributed to the decline in case findings from 1995 to 1996 include: 1) detection of only new (incident) cases rather than both new and previously existing (prevalent) cases, and 2) a drop in the number of children screened from certain high risk groups (specifically, Caucasian and African-American children).

The analyses in this report are based on data reported to CLPP by San Francisco institutions and laboratories serving those institutions. Although there has been an increase in the number of screenings performed and reported in San Francisco, universal data reporting has not yet been achieved. Therefore, the results of this report should not be generalized beyond the sample population presented.

CLPP surveillance data has been analyzed to determine the proportion of new cases among children receiving initial blood lead tests each year. New cases are defined as ≥15μg/dL. The range of case findings has been 1.9 to 4.4 percent of total tested per year.

CLPP also analyzed age, race/ethnicity, zip code and institution in order to identify trends between 1991 and 1995. Among the age variable, two-year-olds followed by one-year-olds yielded the highest proportion of cases. Race/ethnicity analysis revealed Caucasian and African American children to be most at risk, even though numbers tested among both groups have significantly dropped in recent years. The highest numbers for screening and case finding were observed in the Mission District (94110 zip code), where the older housing and greatest number of major medical institutions are situated. Mission Neighborhood Health Clinic (MNHC) and San Francisco General Hospital (SFGH) together account for 52.8% of the total screening reported from various institutions in the city.

CLPP's efforts have been very effective at increasing screening at San Francisco DPH clinics. Between 1994 and 1995, the percentage of children receiving their initial blood lead test at those clinics increased 41%. An additional increase of 6.8% occurred from 1995 to 1996.

In comparison to screening and case finding data, environmental findings showed little variation from year to year. The underlying reason for this is that the overwhelming majority of the sites investigated (94%) were built before 1950, when lead-based paint was in widespread use.

From July 1991 to July 1997, 173 residences accounting for 197 case children were investigated for lead hazards. Some cases had more than one site investigated. In 91% of the sites investigated, at least one environmental lead source was identified. Of the 15 sites investigated where no lead source was identified, ten involved cases where the child was exposed at a previous residence, in another country, or at an alternate site. In only five sites (<3%), no source or probable cause of lead poisoning was identified.

The most common environmental sources identified in CLPP investigations were lead-based paint, lead contaminated soil, and lead dust. For homes where interior and/or exterior paint samples were collected, 68% had at least one interior lead paint hazard, and 85% had an exterior lead paint hazard. Of homes where soil samples were collected, 61% had at least one lead soil hazard.

Analysis of the highest interior and exterior paint lead levels per site revealed that exterior paint had a median lead level 8 times greater than that of interior paint. Fifty percent of the highest exterior paint samples per site were greater than 8% lead or sixteen times the definition of lead-based paint. Specific components found to contain very high levels of lead in paint include: interior and exterior friction surfaces of windows, doors, exterior windowsills and window casings, and exterior walls.

One of the greatest challenges the CLPP has faced has been the capture of lead screening data from all San Francisco medical providers. CDC Guidelines (1991) recommend that all children be screened at least at 12 and 24 months of age. The rationale for the CDC screening guidelines lies in the fact that young children are at the highest risk of lead exposure due to their significant hand-to-mouth behavior and their close proximity to lead contaminated surfaces (i.e. floors, windowsills, etc.). Young children are also the most susceptible to the effects of lead exposure because of their rapidly developing nervous systems.

It is encouraging that there has been an increase in the number of children screened and reported to the DPH. Unfortunately, comprehensive data capture has not been attained for two major reasons. First, not all San Francisco providers are screening children according to the CDC guidelines. Second, not all screening data is reported to the DPH, especially data from private physicians. CLPP estimates that data captured from 1991-1996 includes at most only 5 to 15% of San Francisco children eligible for blood lead screening.[2] If this is indeed the case, there may be up to 1,000 children in San Francisco with undiagnosed lead poisoning.

Please refer to attachment at the end of the document for fuller details on screening numbers and case finding proportions.

PART 1: EVALUATION OF SCREENING AND SURVEILLANCE DATA

Limitations to Data Analysis

A. Lack of Universal Reporting

Universal reporting refers to reporting of *all* blood lead levels for children under the age of six years to CLPP. Currently, no universal reporting system is in place to capture data on blood lead levels on children in San Francisco. Most service providers are reporting data to CLPP on a voluntary basis, utilizing different reporting tools; such as lab slips, Child Health and Disability Prevention (CHDP) billing forms, San Francisco General Hospital log, Mt. Zion log, etc. Two major laboratories, namely SmithKline and Unilab, send lab printouts to CLPP. Kaiser Permanente San Francisco and University of California San Francisco Medical Center (UCSF), two major medical providers in the City, have not reported their data to the CLPP. Limited Kaiser data for 1991-1996 was obtained through the Department of Health Services (DHS). UCSF reported data to the CLPP from a special study conducted from 1992 through 1994. The CLPP is anxiously waiting for DHS to set up electronic data transfer from laboratories to DHS and to the county lead programs in order to capture all screening data.

B. Incompleteness of Data

In addition to the lack of universal reporting, the data that we do capture is not complete. Forty-five percent of our data does not have race/ethnicity codes, and 40% do not have addresses and zip codes. However, we have complete demographic information for all children with blood lead levels $\geq$10µg/dL due to CLPP's follow-up. As a result of incomplete demographic information for children with low blood lead levels, it is difficult to compare case data with low blood level data ($\leq$10µg/dL). An additional bias occurs because much of our data is obtained from CHDP billing and Medi-Cal. Therefore, the data better represent children with subsidized health coverage (low income), as opposed to children from middle and upper income levels with private insurance coverage.

C. Blood Lead Data Below Laboratory Detection Limit

A large proportion of CLPP data is below the detection limit* as set by individual laboratories. Some laboratories report levels in whole integers down to 1µg/dL, whereas other laboratories report levels from 0-5µg/dL as "<5µg/dL", which makes finding an average** blood lead level impossible. Also individual laboratories have used different detection limits at a given time, and those limits were changed over the years.

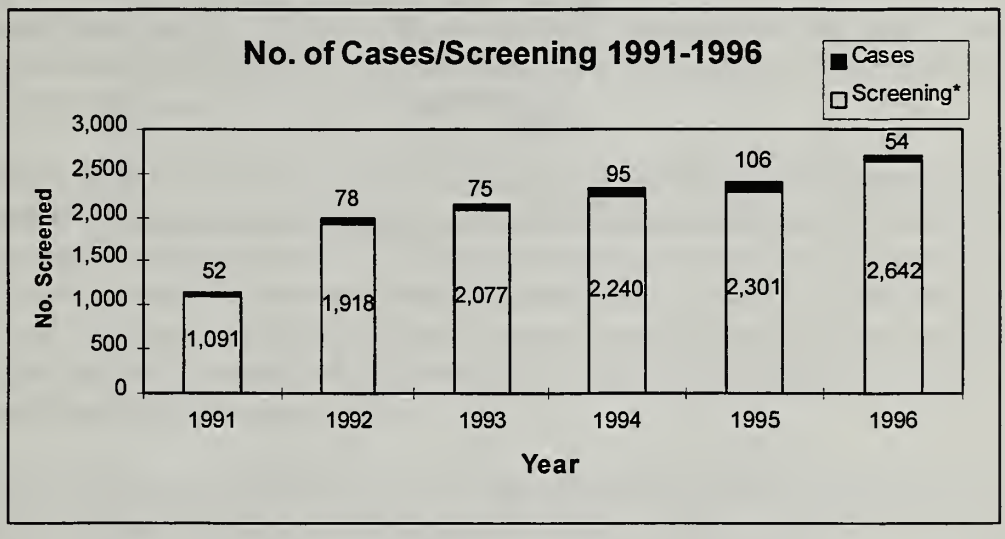
The analyses presented in this report is based on a "convenience sample" of children tested, results reported to CLPP, and those whose demographic information was fully reported. ***Because CLPP was not able to collect complete information for all children at risk, these results cannot be generalized beyond the population presented.***

** detection limit = Point below which labs can not get an accurate reading*

*** average = Geometric Mean has been used in this analysis to describe the average number, due to the fact that the data is not normally distributed, but rather is log normally distributed (i.e. arithmetic mean and median are not the same).*

Screening and Case Finding Trends per Year

CLPP data indicates that screening has been on an overall increase since 1991. A total of 12,269 children under the age of six years received an initial venous blood lead test in the city between 1991 and 1996. Overall, screening per year has more than doubled between 1991 and 1996. Increases in screening were observed every year, but the greatest increase was observed between 1995 and 1996. Proportions of cases by years were calculated, and are shown below by the darker section of the No. Screened bar.

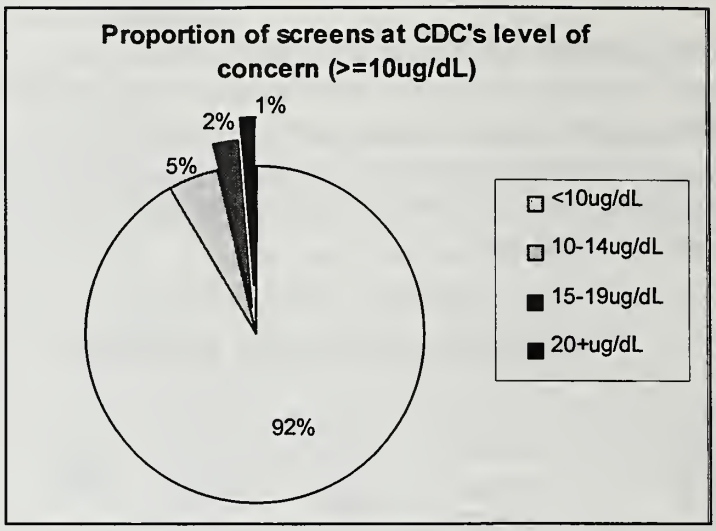


While screening and case findings data both showed an overall increase, case findings followed a different pattern. Case findings increased by 50% between 1991 and 1992 and remained stable through 1993. As compared to the previous year, in 1994 case findings further increased by 26.7% and then by 11.6% in 1995. 1996 is the first year where a decrease of 49% in number of cases is observed. Possible reasons for this decrease are discussed later in this report.

CLPP defines a case as one initial blood lead level of 15µg/dL. However, CDC defines the level of concern as ≥10µg/dL, based on epidemiological studies. The prevelance rate for the time period covered in this report ≥10µg/dL is 8.4%. In April 1996, the CLPP implemented a system to assign timely health education services to children detected at low elevated blood lead levels (10-14µg/dL), aiding in the prevention of further exposure and hopefully preventing them from becoming a case at a later time. So far more than 200 children have been processed through this system.

* In all graphs, the screening total indicated includes those tests which resulted in cases. In all graphs cases are defined ≥15µg/dL.

Proportion of Screens at CDC's Level of Concern (≥10µg/dL)



Discussion

This report suggests possible reasons for an increase in screening and a decrease in case findings in 1996 as compared to earlier years:

1. CLPP health education staff has been in the field since the inception of the program in 1993. Need for screening and lead prevention have been enforced through multiple modes of education including media and in-person education. Outreach to the Asian community is a distinguished example. It is possible that as a result of educating the community, particularly parents in the need for screening and prevention of lead poisoning, we observed an overall increase in screening and a decrease in case findings.

2. CLPP did not limit its education to the community, but also provided professional education to the medical providers in San Francisco. It is possible that screening increased as a result of the "Provider Outreach Project." CLPP's case manager met with medical providers on individual basis, as well as organized Grand Rounds at major medical institutions to provide information. As a result, medical providers increased screening and may have educated their clients regarding lead prevention during their clinic visits. CLPP staff also provided education in many clinic waiting room.

3. As a result of increased screening, more low-risk children were screened in 1996 than in previous years, thus capturing a smaller group of children with elevated blood lead levels.

4. CLPP's ability to capture data in 1996 also improved due to enhanced reporting, routing and increased cooperation by providers. This could explain the increase in screening, but not in case findings.

5. It is possible that in 1996 only "new" (incident) cases were found, whereas in previous years new and previously existing (prevalent) cases were found. This factor would create a trend of decreased case findings.

Quantifiable Conclusion: The only quantifiable conclusion of the report was that the number of screens for Caucasian and African-American children dropped over this time period, both of which constituted high-risk groups. It is possible that 46% of data with missing race/ ethnicity information may be comprised of these two ethnic groups. However, data with missing information has somewhat stayed stable over the years, ranging from forty two to fifty three percent. Therefore the decrease in numbers for both of these groups can be attributed as a major factor in overall case drop.

Program Case Management Services

CLPP provides a wide range of services to children with elevated blood lead levels. **CLPP defines a case as one initial blood lead level of 15µg/dL.** All cases receive a thorough home visit by a public health nurse (PHN) that includes providing health education, as well as completing a detailed initial investigation according to DHS protocol. As shown below, the highest level cases also receive an environmental investigation according to DHS protocol.

Blood Lead Level	CLPP Services
10-14µg/dL	Follow-up including phone teaching and home visit from CLPP health educators
15-19µg/dL	Follow-up including a home visit by district-based PHN
Two levels between 15-19µg/dL OR ≥20µg/dL	Follow-up including a home visit by PHN and an environmental investigation by a CLPP Environmental Investigator.

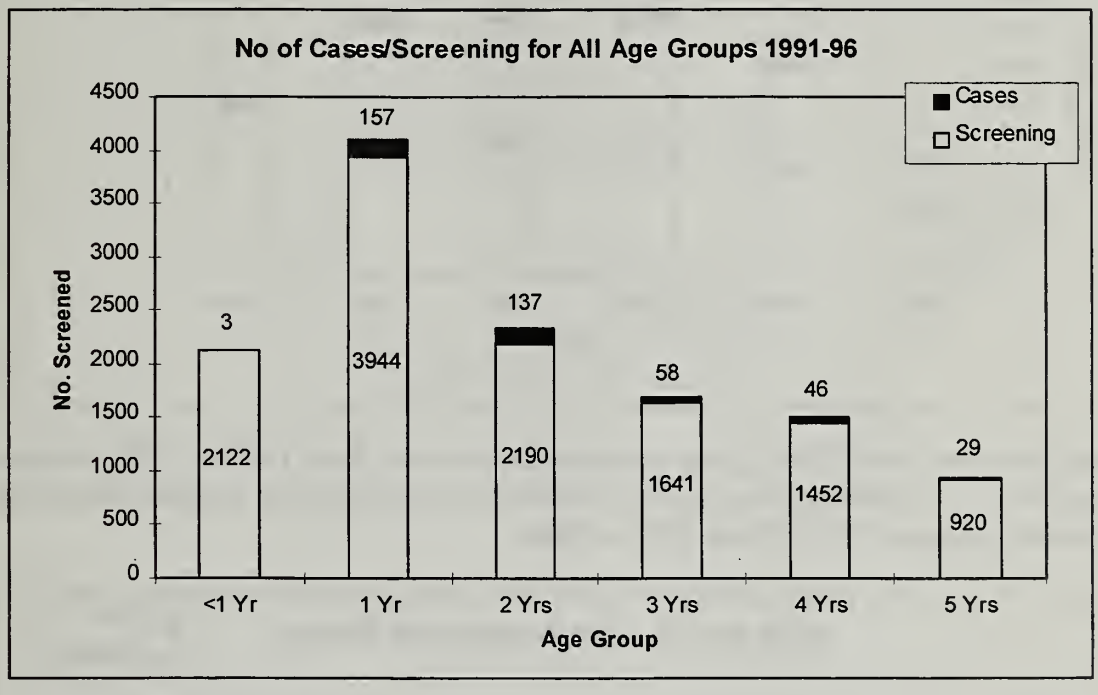
Compliance Program

Beginning in July 1995, CLPP's environmental investigators began to utilize the Health Director's authority to use Notices of Violation to order remediation of identified lead hazards in the homes of case-managed lead-poisoned children. In October 1996, the Health Director's authority was expanded by San Francisco legislation, and CLPP environmental investigators now have the ability to use both Emergency Orders (completion within 48 hours) and Lead Hazard Reduction orders (14-30 days) to the property owner require property owners to remediate lead hazards cited in the Orders..

Age Analysis

Does Age Distribution indicate the age groups at risk?

CLPP data contains age information, which is calculated automatically from the date of birth and date of test. Proportions of cases by age groups were calculated, and are shown below by the darker section of the No. Screened bar.



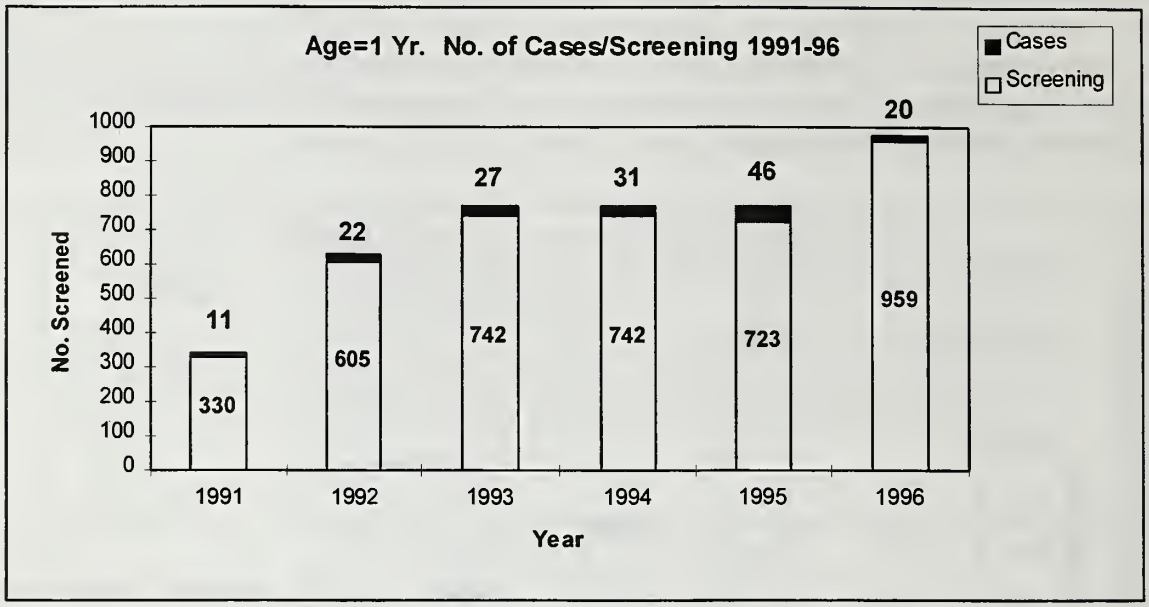
Age Group	Proportion of Cases per Age Group
< 1 Year	0.14
1 Year	3.98
2 Year	6.26
3 Year	3.53
4 Year	3.17
5 Year	3.15

The data reveals that most screening is taking place among one-year-olds (n=3,944) followed by two-year-olds (n=2,190), and children under-one-year (n=2,122). A higher proportion of cases was found among two-year-olds; followed by one-year-olds, establishing one and two-year-olds as high-risk groups. This is consistent with earlier studies that have found one and two-year-olds to be at greater risk due to mobility and hand to mouth behavior. CDC blood lead screening guidelines promote mandatory lead testing of children at one and two years of age, and CHDP providers were required to do so by a lawsuit settlement against DHS. From 1991-1996, among children under one year of age only three cases have been found. This suggests that infants under one year of age are a low-risk group in San Francisco.

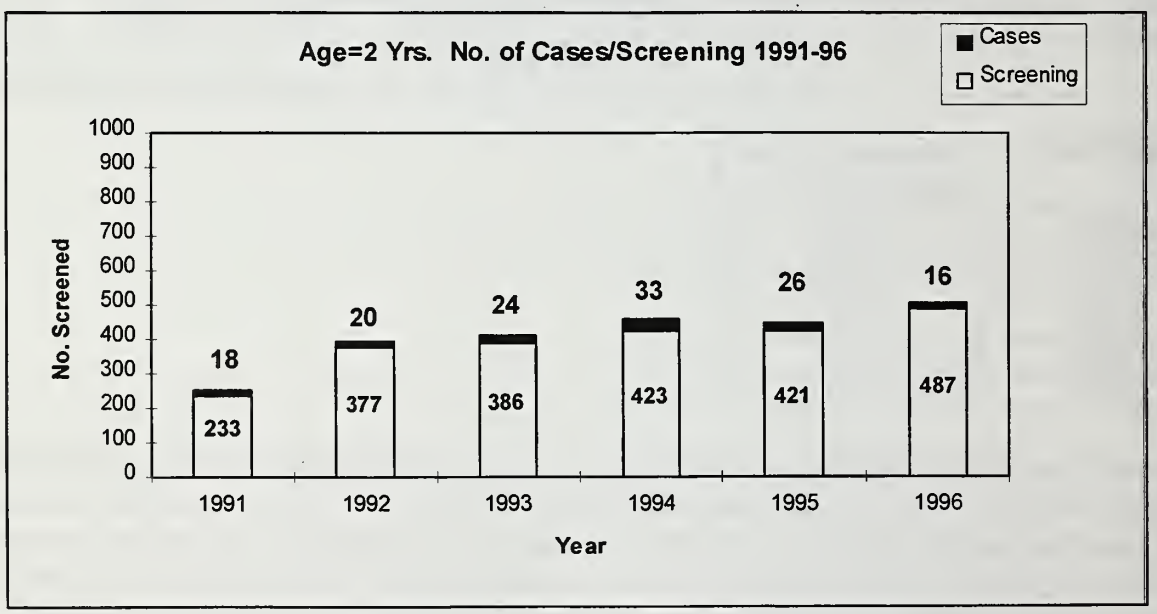
* In all graphs, the screening total indicated includes those tests which resulted in cases. Also in all graphs cases are defined ≥15µg/dL

How is age distribution related to case decline in 1996?

The following graphs show screening and case finding trends among one and two-year-old high risk groups.



Screening in the one-year-old age group increased dramatically from 1995 to 1996. However, the proportion of cases among this group of children who were screened declined from 6.4% to 2.1% (negative change of 4.3%) from 1995 to 1996.



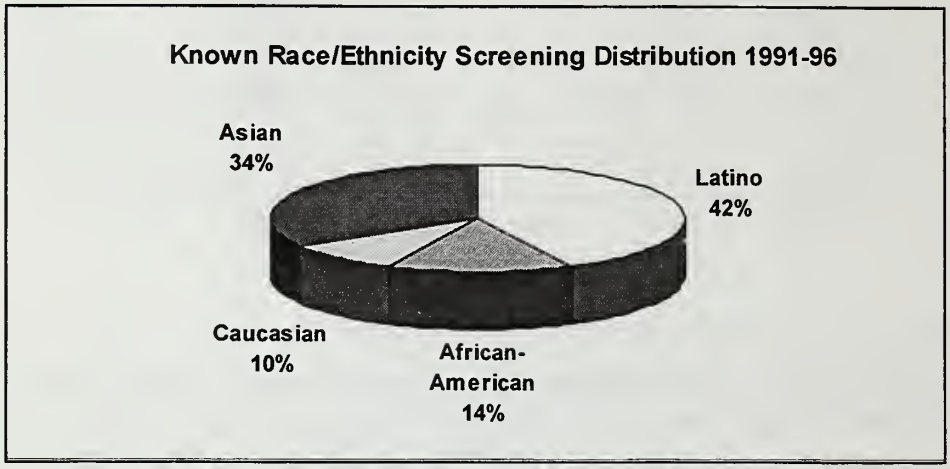
Contrary to one-year-olds, no dramatic increase in screening was observed among two-year-olds. In addition, the proportion of cases among this age group declined from 6.2% to 3.3% (negative change of 2.9%) from 1995-1996.

Age Group	Proportion of cases					
	1991	1992	1993	1994	1995	1996
1 Year-Old	3.3	3.6	3.6	4.2	6.4	2.1
2 Year-Old	7.7	5.3	6.2	7.8	6.2	3.3

Race/Ethnicity Analysis

Does Race/Ethnic Distribution indicate the race/ethnic groups at risk?

Screening: Race/ethnicity codes were not available for half of the data. Of the data with known Race/ethnicity, the Latino* group has received the highest percentage (42%) followed by Asian (34%), African-American (14%) and Caucasian (10%). These screening data are biased by demographic data captured from specific clinics that see mostly Latino* and Asian patients who are easily coded by surnames.



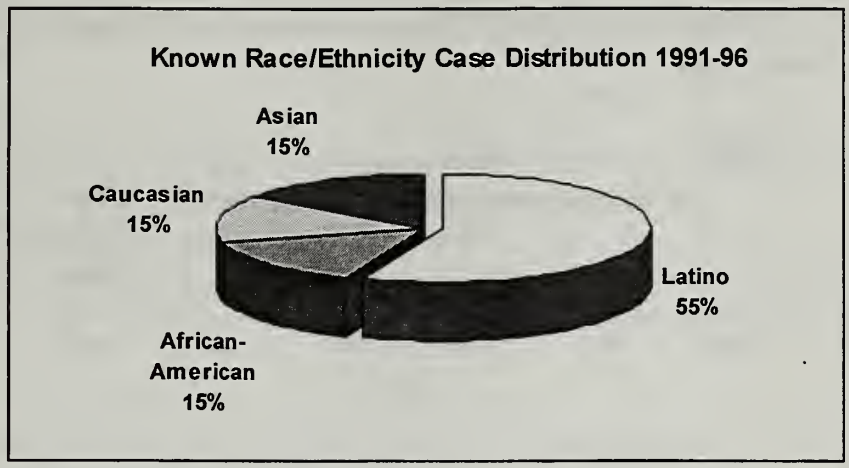
Among the age groups with known race/ethnicity information, Asians show a trend of increased screening since 1993. This increase can be attributed to extensive outreach within the Asian communities by the program's Cantonese-speaking outreach worker hired in 1995, as well as by community based organizations (CBO) active on this issue. The number of Latino children being tested has remained some what constant over the years.

Table # 2. **Race/Ethnicity Distribution 1991-1996**

Race/Ethnicity	No. Screened	Cases No.⇩15µg/dL	Proportion of all Cases	Cases per No. Screened
Latino	2,863	258	56.0%	9.0%
Asian	2,256	67	15.0%	3.0%
African-American	969	67	15.0%	7.0%
Caucasian	640	67	15.0%	10.0%
Unknown	5,541	0	0.0	0.0
TOTAL	12,269	459	NA	4.0%

Latino ethnicity group includes children belonging to all races with Hispanic marked as their ethnicity. In this analysis, all other race/ethnicity groups can be assumed to be Non-Hispanic.

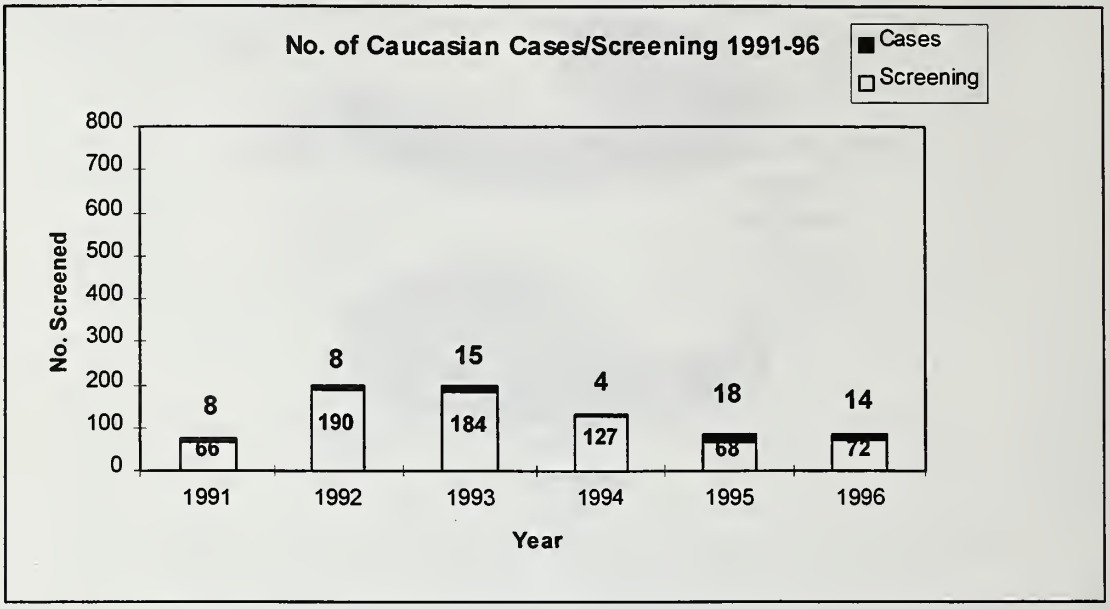
Cases: Contrary to the screening data, race/ethnicity is available for all cases (children with blood lead levels of ≥15μg/dL). Fifty-five percent of CLPP's total case load between 1991 and 1996 is Latino, but the rest of the case load is evenly divided among Caucasian, African-American and Asian children.



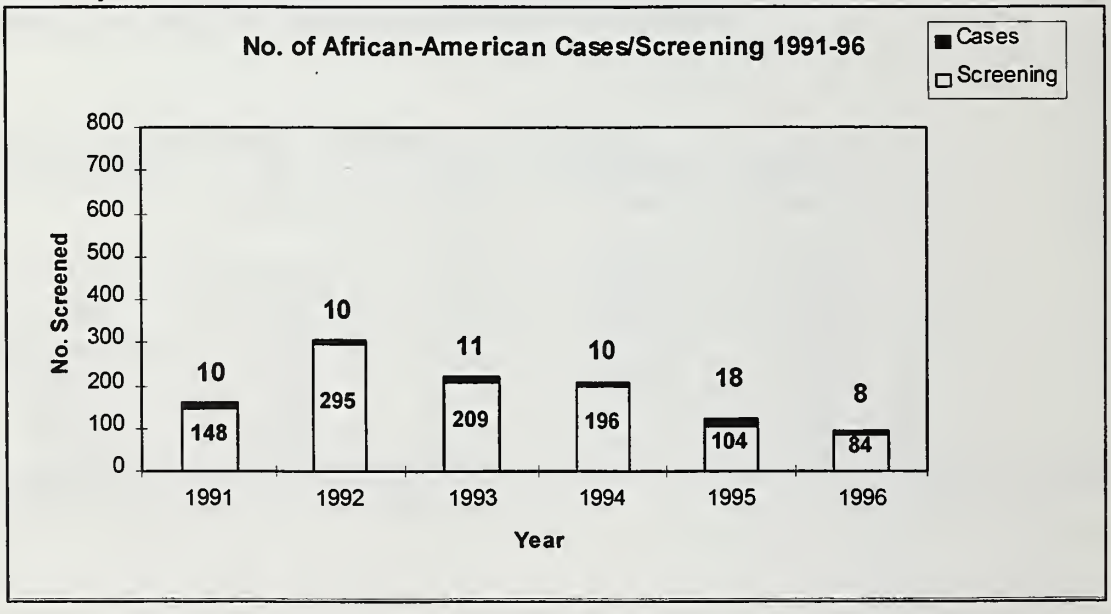
How is race/ethnic distribution related to case decline in 1996?

It is clear from the data in the two graphs below that very few numbers of Caucasian and African-American children are being screened. Significantly more Caucasian and African-American children should be screened, even if a large proportion of children with unknown race/ethnicity (n=5,644) may be comprised of Caucasian and African-American. This is further substantiated on the next page.

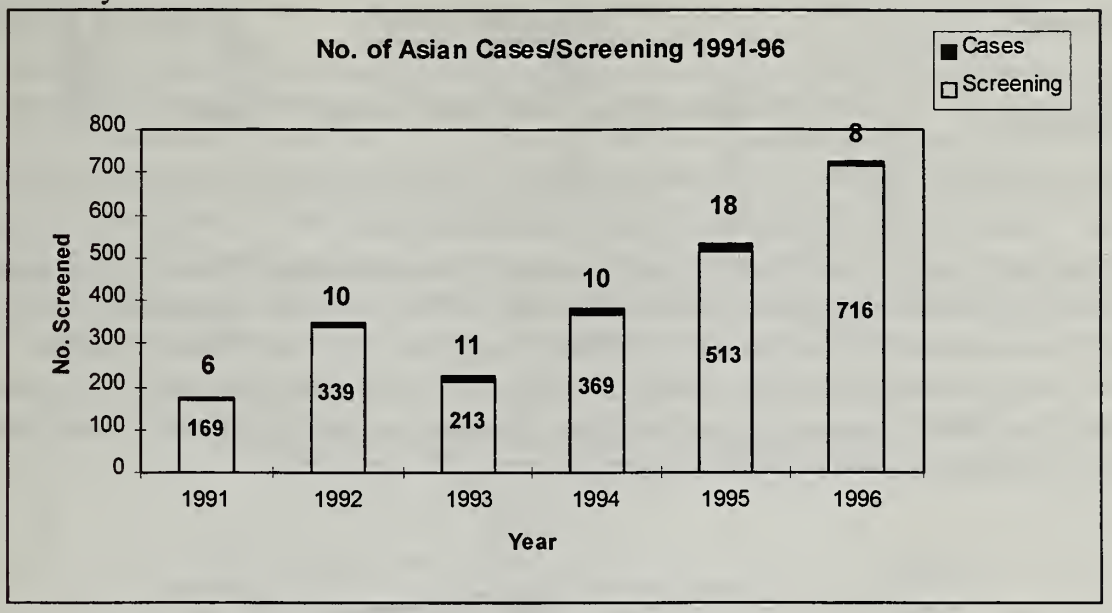
Race/Ethnicity = Caucasian



Race/Ethnicity = African-American

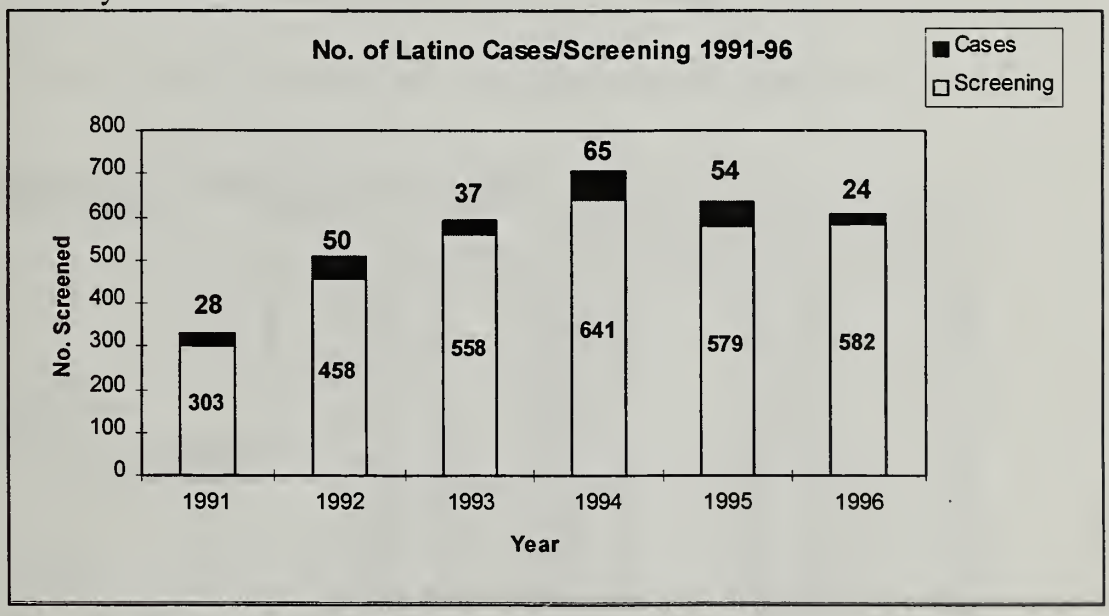


Race/Ethnicity = Asian



The above graph shows the effectiveness of CLPP outreach to the Asian population. In terms of screening, the Asian population showed the greatest increase in screening between 1991-1996. This is a positive example of education and outreach to the San Francisco Asian community resulting as a collaboration between DPH (Department of Public Health), CBOs and health-care providers.

Race/Ethnicity = Latino



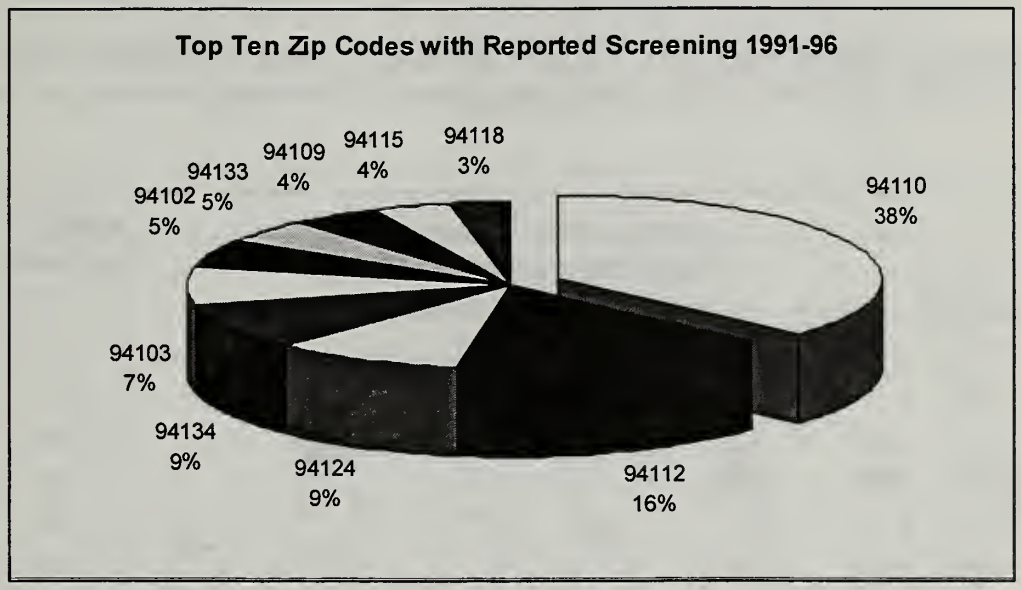
Race/ Ethnicity	Proportion of cases					
	1991	1992	1993	1994	1995	1996
Caucasian	12.1	4.2	8.2	3.2	26.5	19.4
African American	6.8	3.4	5.3	5.1	17.3	9.5
Asian	3.6	2.9	5.2	2.7	3.5	1.1
Latino	9.2	10.9	6.6	10.1	9.3	4.1

Examining case data by race/ethnicity groups reveals different patterns. The drop in ***proportion*** of cases among all ethnicity groups screened between 1995 to 1996 was substantial, *except* among Caucasian and African-American children. For Caucasian and African-American children, where screening decreased, the proportion of cases increased over years. This makes these both race/ethnicity groups high-risk groups. However, among all ethnic groups screening numbers increased and case numbers dropped between 1995 and 1996.

Zip Code Analysis

Does zip code distribution indicate geographic zones most at risk?

As mentioned above, zip code information is missing for 40% of CLPP data. San Francisco has 27 zip codes. From 1991-1996, most screening occurred in the following ten zip codes. The highest percentage of initial screening took place in the Mission (38%, 94110), Excelsior (16%, 94112) and Bayview (9%, 94124) districts. Due to the uneven distribution of screening by zip code, it is difficult to draw conclusions as to geographic zones most at risk.



Screening and Case Finding in top ten zip codes

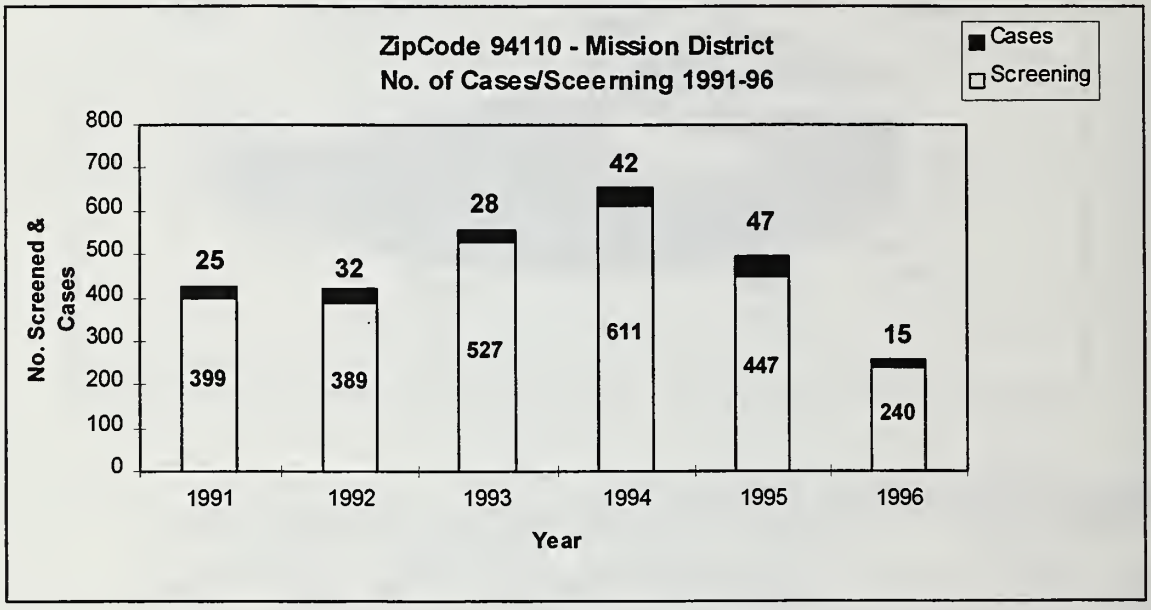
District Name	Zip Code	Rank by No. Screened		Rank by Cases No.⇩15µg/dL		Rank by Cases as % of Screens	
Mission	***94110***	***R1***	***2421***	***R1***	***189***	***R1***	***7.8***
Excelsior	***94112***	***R2***	***1048***	***R2***	***42***	***R9***	***4.0***
Bayview	***94124***	***R3***	***625***	***R3***	***32***	***R5***	***5.1***
Visitacion Valley	94134	R4	588	R7	17	R10	2.9
South of Market	94103	R5	485	R4	24	R6	4.9
Hayes Valley/ Parts of Tenderloin	***94102***	***R6***	***355***	***R4***	***24***	***R3***	***6.8***
Northeast	94133	R7	311	R9	13	R8	4.2
Nob Hill	94109	R8	287	R8	14	R7	4.8
Western Addition	***94115***	***R9***	***254***	***R6***	***19***	***R2***	***7.5***
Richmond	94118	R10	210	R10	11	R4	5.2

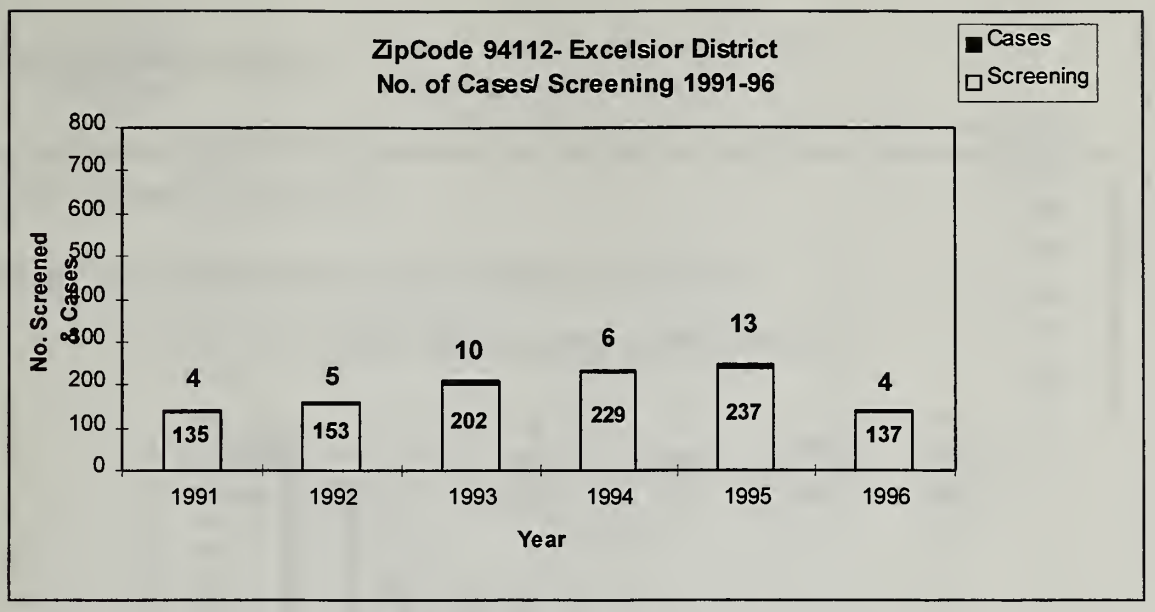
The majority of cases were also from the above ten mentioned zip codes listed above: 94110 (189 cases), 94112 (42 cases) and 94124 (32 cases). Zip code 94110 (Mission) also yielded the highest proportion of case finding (7.8%) followed by 94115 (Western Addition) with 7.5%.

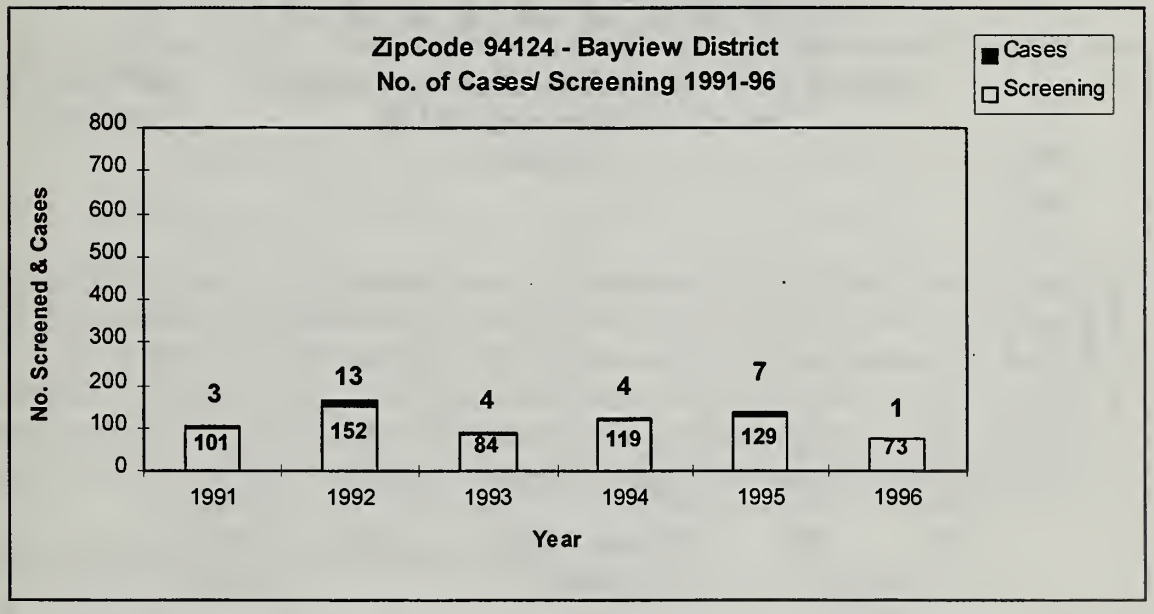
Explanation of Case Distribution

Two districts (94110, 94115) contain most of the City's Victorian, often pre-1900, housing. This housing stock can also be assumed to contain the greatest concentration of lead-based paint. A large number of medical providers, including Mission Neighborhood Health Center and SFGH, are based in and around the Mission district (94110). It was CLPP's first target area at the inception of the CDC grant. In addition to working with providers in and around the Mission district, CLPP performed a community based door-to-door screening in the district during 1993-94, which resulted in screening 415 children. CLPP has continued to target the Mission district as a high-risk area and has conducted greater outreach there than in any other district.

Both screening and case finding numbers in these top three zip codes have fallen in 1996 as compared to 1995. The three districts with greatest number of screening and cases are shown below.

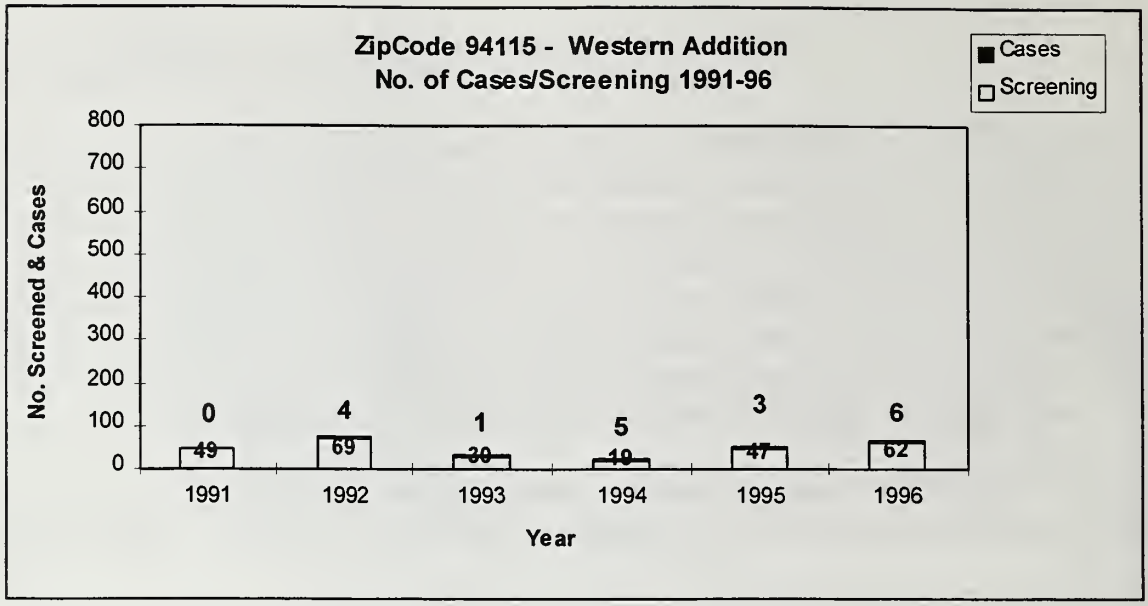


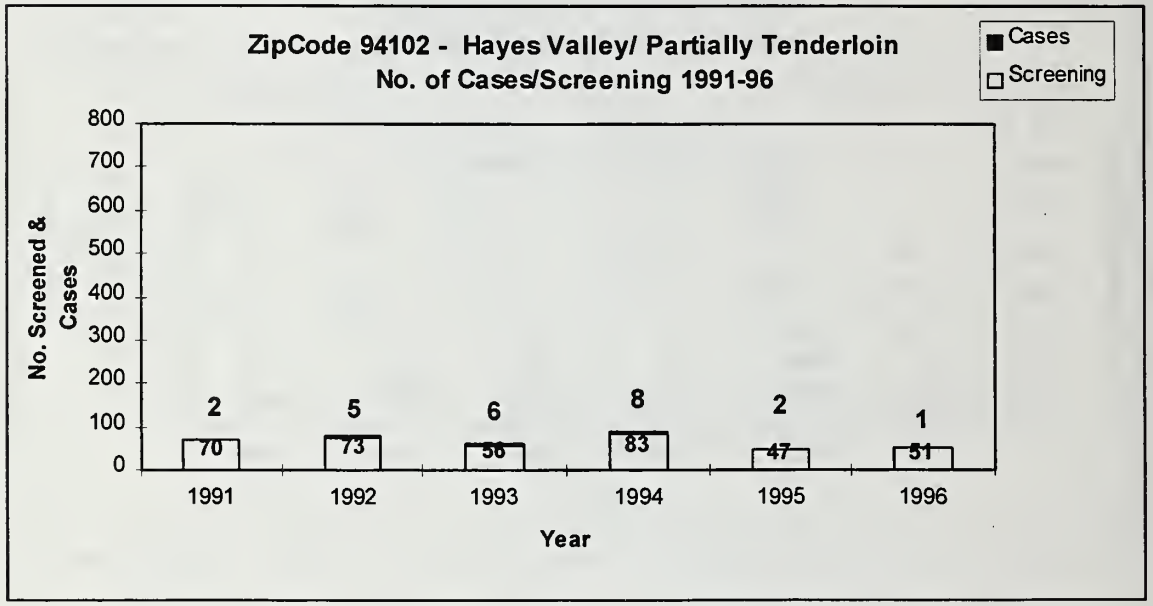




Highest Proportion of Cases by District

Districts 94110, 94115 and 94102 represent the greatest percentage of cases found per number screened, and therefore 94115 and 94102 are also presented below. It is hard to draw strong conclusions due to the very small numbers of children tested in these last two zip codes.

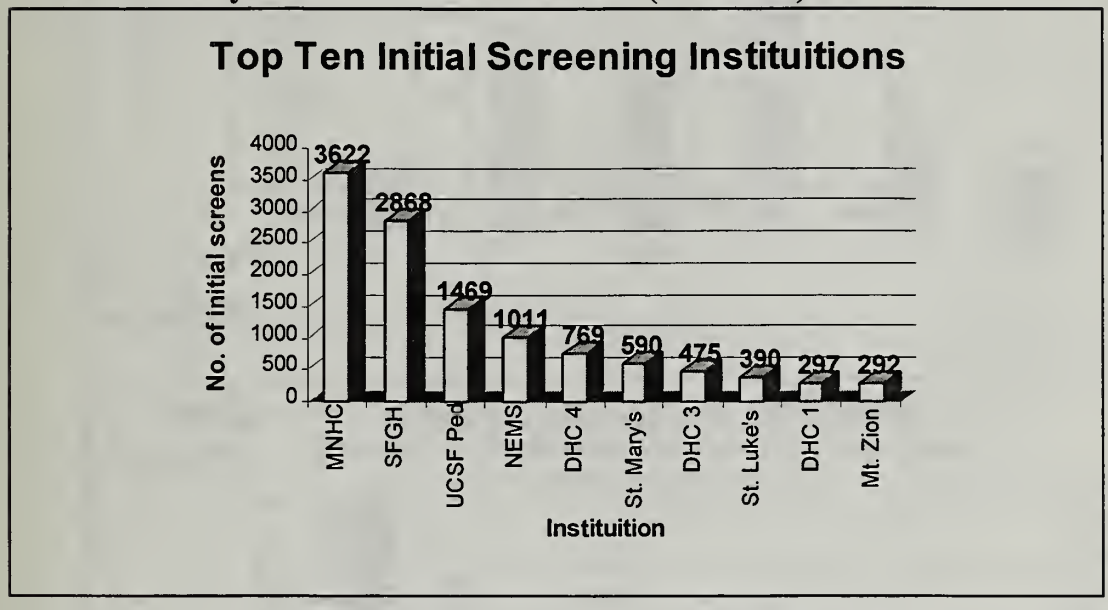

ZipCode 94115 - Western Addition
No. of Cases/Screening 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
0
4
1
5
3
6
49
69
30
19
47
62
1991
1992
1993
1994
1995
1996
Year


ZipCode 94102 - Hayes Valley/ Partially Tenderloin
No. of Cases/Screening 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
2
5
6
8
2
1
70
73
56
83
47
51
1991
1992
1993
1994
1995
1996
Year

Institutional Analysis

Does institution distribution indicates the institutions with most screening and the trends in screening over years?

Initial Screens by Institution in San Francisco (1991-1996)



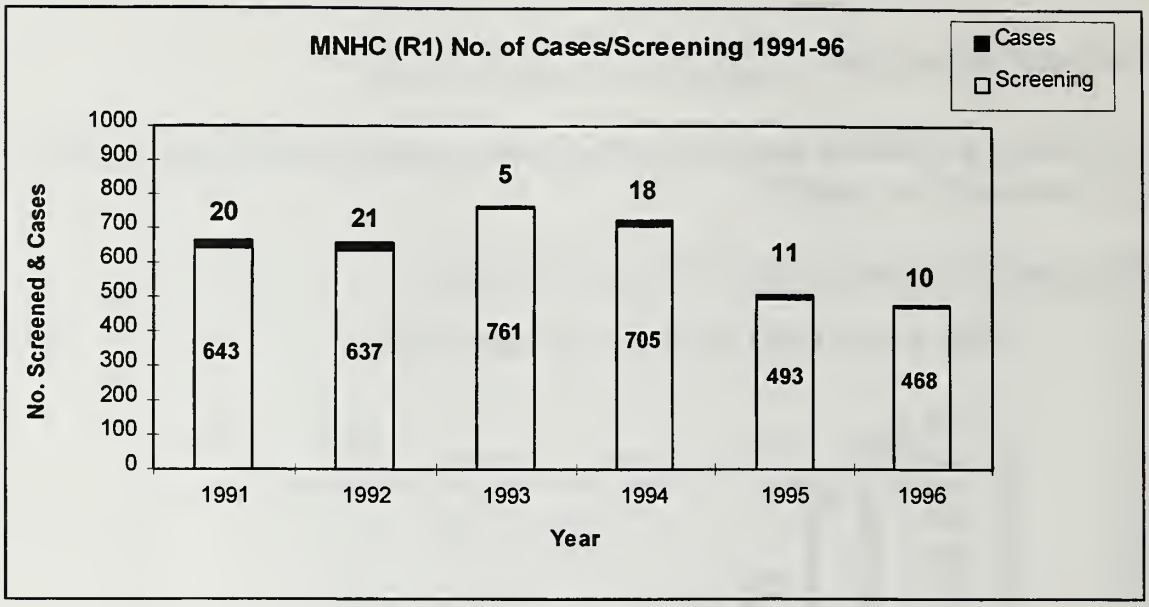
CLPP data shows that in San Francisco ninety-six percentage of reported initial screens during 1991-1996 occurred at the institutions in the city (see above). The first and second ranked institutions, MNHC and SFGH, are in the 94110 zip code. This complements the fact that the majority of the children getting tested have addresses from the Mission district. The two institutions alone account for 52.8% of the total initial screening reported to CLPP. For this reason, it is difficult to draw conclusions as to institutional patient populations most at risk.

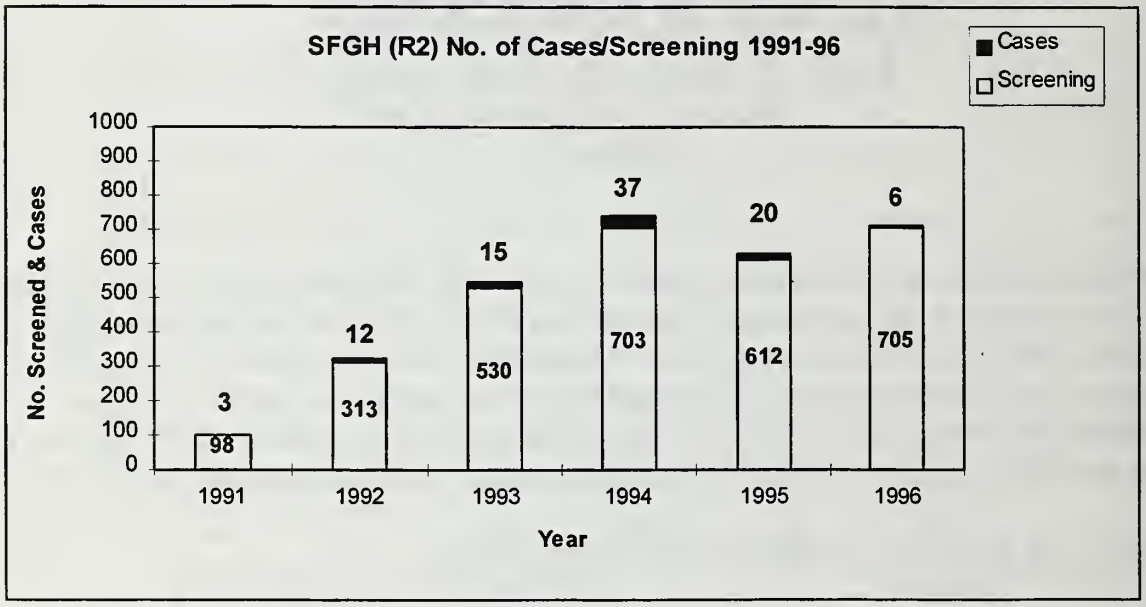
Table # 3. Top Ten Initial Screening Institutions 1991-1996

Institution	No. of Screening Reported	Location of Institution
MNHC = Mission Neighborhood Health Center	3,622	94110
SFGH = San Francisco General Hospital	2,868	94110
UCSF Ped = U.C.S.F. Pediatrics*	1,469	94143
NEMS = North East Medical Services	1,011	94133
DHC 4 = District Health Center 4	769	94133
St. Mary's = St. Mary's Hospital	590	94117
DHC 3 = District Health Center 3	475	94134
St. Luke's = St. Luke's Hospital	390	94110
DHC 1 = District Health Center 1**	297	94114
Mt. Zion = Mt. Zion Hospital	292	94115

** UCSF reported data to CLPP from a special study conducted from 1992 through 1994.*

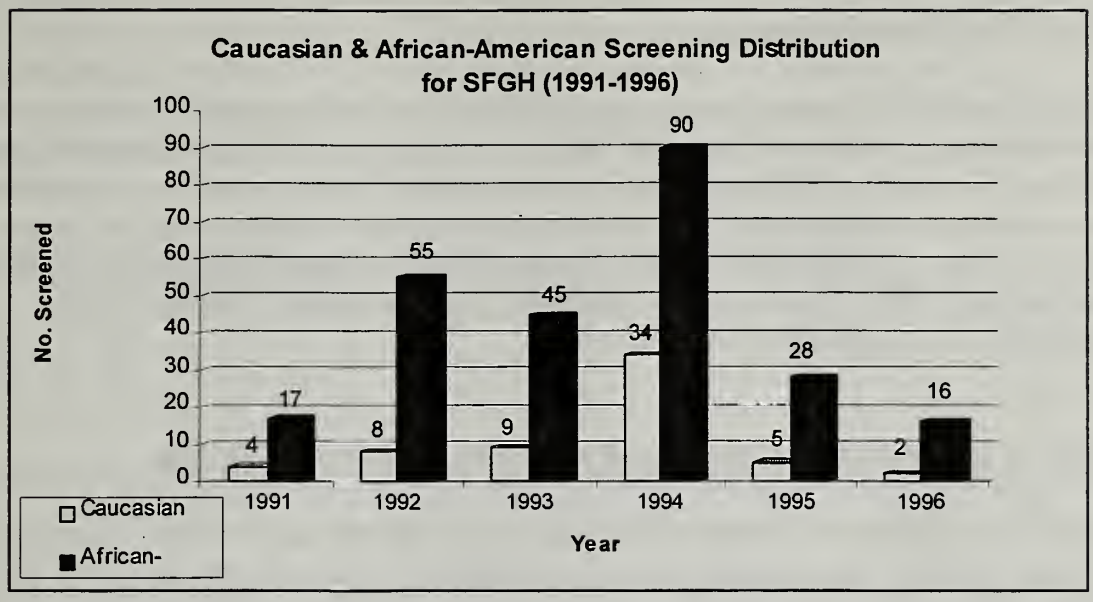
*** Some DHC 1 patients come from satellite clinic in the Mission District (94110).*

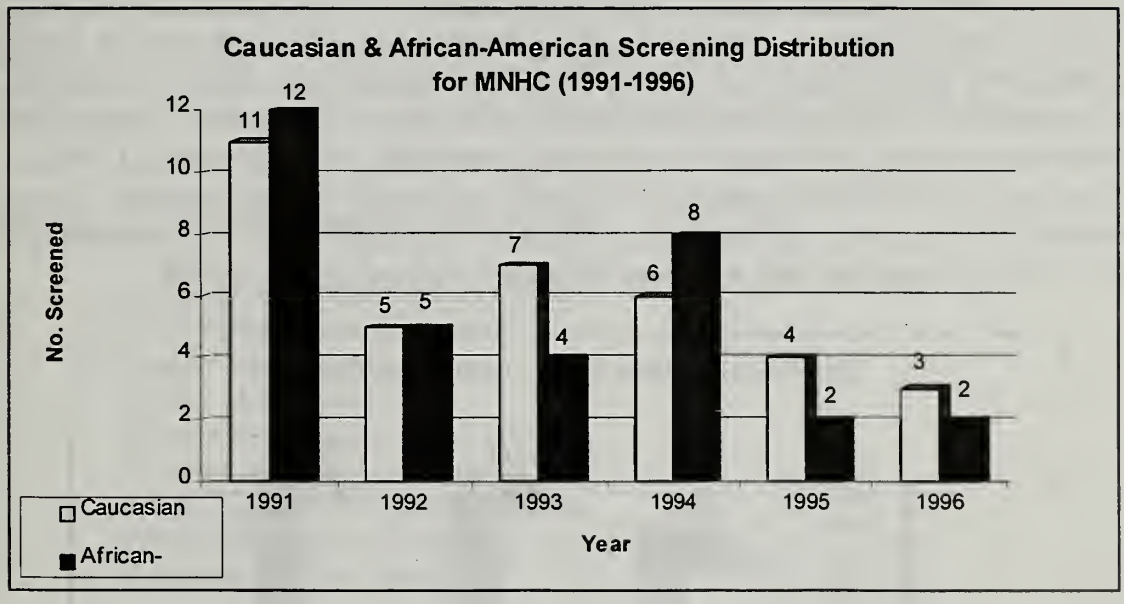




Institution	Proportion of cases					
	1991	1992	1993	1994	1995	1996
MNHC	3.1	3.3	0.7	2.6	2.2	2.1
SFGH	3.1	3.9	2.8	5.3	3.3	0.9

The number and proportion of cases found at both MNHC and SFGH decreased in 1996 as compared to 1995.





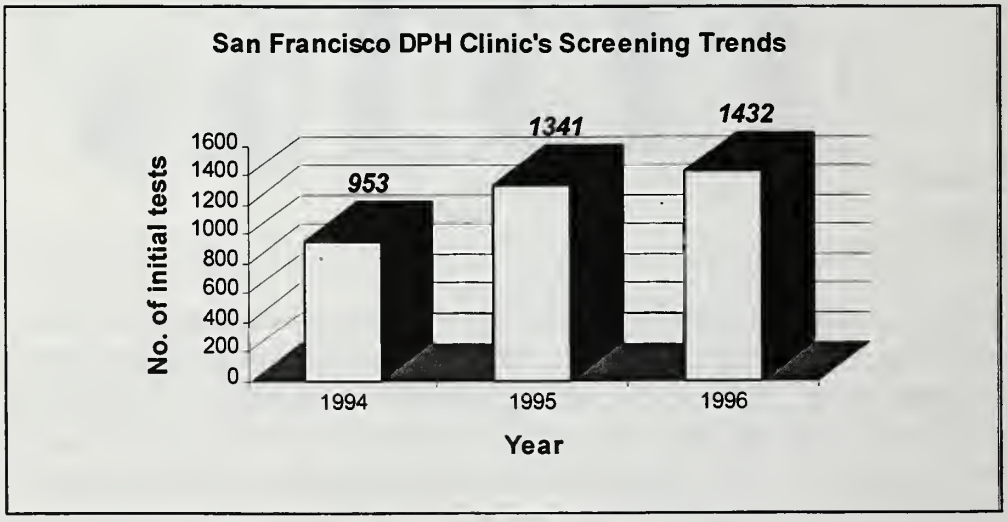
Because MNHC and SFGH do 53% of reported screening we analyzed ethnic trends for Caucasian and African-American children, identified as high-risk groups earlier in this report. Both ethnic groups show a decrease in screening at these two institutions. According to the SFGH Annual Report 1995-96, the percentage of Caucasians and African-Americans population stayed stable from 1991-96. However, instability in the proportion of children with lead poisoning throughout this time period might be due to the small numbers of children screened within these two ethnic groups.

Medical Provider Outreach

Since 1994, the CLPP case manager has systematically contacted every San Francisco pediatrician serving low-income, high-risk, Medi-Cal or CHDP eligible children and visited the providers in clinics and individual practices. Provider education efforts focus on San Francisco highest risk areas, as determined by age of housing and number of children living in poverty. During these visits, the CLPP case manager reviewed CDC's screening guidelines, as well as case management policies and procedures. Individual provider education has resulted in increased screening among those providers visited.

Screening Increase at Community Health Network Clinics

Community Health Network includes SFGH, five District Health Centers (DHC), Potrero Hill Health Center (PHHC) and Southeast Health Center (SEHC). Between 1994 and 1995, the percentage of children receiving their initial blood lead test at the above mentioned San Francisco DPH clinics increased 41%. An additional increase of 6.8% occurred from 1995 to 1996. Since CLPP's inception, increased screening in the community health network system has been an important goal. Initially, these clinics faced many obstacles, including inconsistent laboratory reporting, billing problems, lack of phlebotomy support, resistance to venous draws, and disagreement among physicians about screening guidelines. Over the years, CLPP has helped to resolve each obstacle, resulting in increased numbers of children screened. The change in community health network affiliated clinics testing is illustrated below. The increase in the number of children receiving their initial blood lead test was maintained in 1996.



CLPP staff have conducted in-service training for medical staff at each health center. CLPP also trained several health centers how to draw capillary blood samples that are not lead contaminated. This training was most successful in the Chinatown Public Health Center, where the Asian immigrant community has been more resistant to venous draws. For two years, from 1994-95, CLPP subsidized two phlebotomy positions to be shared by five of the satellite health centers.

While community health network clinics screening from 1994 through 1996 has increased 50% overall, the most impressive increases in screening have taken place in the Southeast Health Center and Health Centers 1 and 2. In these centers screening has increased 467%, 290% and 225% respectively. To support the clinics, CLPP recently developed and distributed a user-friendly version of the CDC questionnaire to each health center. The new version accommodates several checkups and languages on a single page and will help remind providers to screen.

Blood Lead Testing By Community Health Network Centers 1994-1996

Year	SFGH	DHC 1	DHC 2	DHC 3	DHC 4	DHC 5	PHHC	SEHC	Total
1994	666	32	12	59	127	30	21	6	953
1995	592	66	29	251	287	59	30	27	1341
1996	699	125	39	155	273	54	53	34	1432

Percentage Change in Blood Lead Testing By Community Health Network Centers 1994-1996

Year	SFGH	DHC 1	DHC 2	DHC 3	DHC 4	DHC 5	PHHC	SEHC	Total
% change 1994-1995	13%	106%	142%	325%	126%	97%	43%	350%	41%
% change 1995-1996	18%	89%	34%	62%	5%	9%	77%	26%	7%
Overall % change 1994-96	5%	290%	225%	163%	115%	80%	152%	467%	50%

Source: SFGH/ UCSF Toxicology Laboratory screening logs.

Key	Community Health Network Clinic
SFGH	San Francisco General Hospital
DHC1	Mission Castro Health Center
DHC2	Maxine Hall Health Center
DHC3	Silver Avenue Family Health Center
DHC4	Chinatown Public Health Center
DHC5	Ocean Park Health Center
PHHC	Potrero Hill Health Center
SEHC	Southeast Health Center

CDC Guidelines (1991) state that all one and two-year-olds should be screened. This is due to their developmental stage, which involves significant hand to mouth behavior and mobility close to the ground, particularly in an environment like San Francisco, with greater lead sources due to the fact that 68% of the houses were built prior to 1950 (proposed revision to CDC guidelines, 1996). In order to estimate the gap between the number of children eligible for testing and number of children's tests reported to us, we used the number of annual births from DPH Records and Statistics Department to estimate the number of one and two-year-olds eligible for lead testing in San Francisco. As shown in the table below, CLPP data captured a very low percentage (5.5-15%) of children eligible for initial testing between 1991 and 1996. While we estimate only 15% of eligible children screened in 1996, this is triple the rate in 1991. In 1995, DPH ***Epi-Bulletin*** we estimated that there were 1,032 untested children in San Francisco with undiagnosed lead poisoning (≥15µg/dL). In 1997 this estimate was 897 children.

Table # 1. No. of Children Eligible for Lead Testing vs. No. Reported to CLPP

	1991	1992	1993	1994	1995	1996
Number of Live Births in San Francisco	9,893	9,566	9,268	9,045	8,593	8,367
Eligible for Lead Testing: Estimated Number of 1 & 2 Year-Olds	19,786	19,132	19,459	18,834	18,313	17,638
Number of Screens reported to eligible population	1,092	1,918	2,078	2,241	2,298	2,642
Percentage of estimated screens reported to CLPP	5.5.%	10.0%	10.7%	13.0%	12.5%	15.0%

PART 2: EVALUATION OF ENVIRONMENTAL DATA

Primary Cause of Childhood Lead Poisoning

What is the foremost cause of childhood lead poisoning in San Francisco?

Today, the foremost cause of childhood lead poisoning in San Francisco (and in the United States) is lead-based paint and lead-contaminated dust and soil found in older homes.

Lead was a major ingredient in most interior and exterior house paints prior to 1950, with some paints containing as much as 50 percent lead. Lead continued to be widely used in residential paint until 1978, when new laws greatly reduced the amount of lead allowed in paint (the allowable amount was reduced to 0.06 percent lead).

Because the majority of San Francisco's housing was built before 1978 (94%, with 68% built before 1950), lead based-paint, dust, and soil hazards are prevalent throughout the City.

Identification of Lead Hazards

How are lead hazards identified and evaluated for lead poisoned children in San Francisco?

The primary method of lead hazard identification and evaluation used by the San Francisco Department of Public Health (DPH) is what is known as a "risk assessment." A risk assessment is an on-site investigation of a home for lead-based paint hazards that includes a visual inspection, environmental sampling of potential paint, dust, and soil hazards, and a report of the results that describes acceptable strategies for controlling any hazards identified.

The on-site investigation also includes a lead poisoning questionnaire that is administered to the child's parent/guardian by the environmental investigator and the public health nurse (PHN). The combination of the questionnaire and the risk assessment comprises an "environmental investigation."

Environmental Investigations

When did the DPH begin doing environmental investigations and why?

Environmental investigations of the homes of lead poisoned children were initiated as a result of guidelines issued by the Centers for Disease Control (CDC) in 1991. These guidelines recommend that children with blood lead levels of ≥20μg/dL, or persistent at 15-19μg/dL (two blood lead levels 15-19μg/dL at least three months apart), receive an environmental investigation.

In July 1991, the DPH began investigating homes of children with blood lead levels ≥20μg/dL to find and control the sources of lead in their homes. In July 1995, the DPH revised it's protocol to include environmental investigations for cases persistent at 15-19μg/dL.

What are the objectives of an environmental investigation?

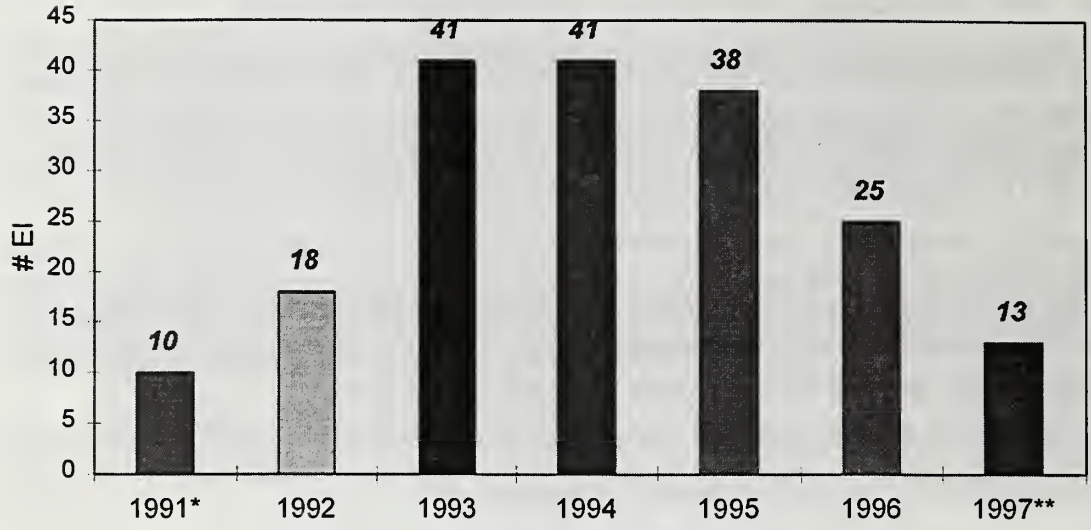
Overall, the objectives of an environmental investigation for DPH cases are to:

1) Identify lead-based paint hazards (including lead-contaminated dust and soil) in the child's home.
2) Investigate other potential sources of lead in a child's environment, such as glazed pottery, home remedies, and parental occupation.
3) Notify and educate the family and landlord about identified lead hazards.
4) Recommend/mandate actions to control lead hazards and prevent further exposure of the child to lead hazards in their home.

How many DPH cases have received environmental investigations?

From July 1991 to July 1997, 197 lead poisoned children received environmental investigations of their home environment. A total of 173 residences were investigated, 24 of which involved more than one case (i.e. two siblings). For nine cases, a secondary residence, i.e. another home or day care where the child spent a significant amount of time, was also investigated.

SFDPH Environmental Investigations by Year
7/1/91- 6/30/97



* The first DPH environmental investigation of a lead poisoned child was done on July 13, 1991.
** Year in progress. Data was evaluated for environmental investigations completed through the month of June.

Sample Collection

How does the environmental investigator determine where to collect environmental samples during an investigation?

The environmental investigator uses both a visual inspection of the child's home and information obtained from the child's parent/guardian via a lead poisoning questionnaire to determine where to collect environmental samples.

The visual inspection identifies areas of flaking, peeling, or damaged paint, and areas where lead dust from such paint may have accumulated.

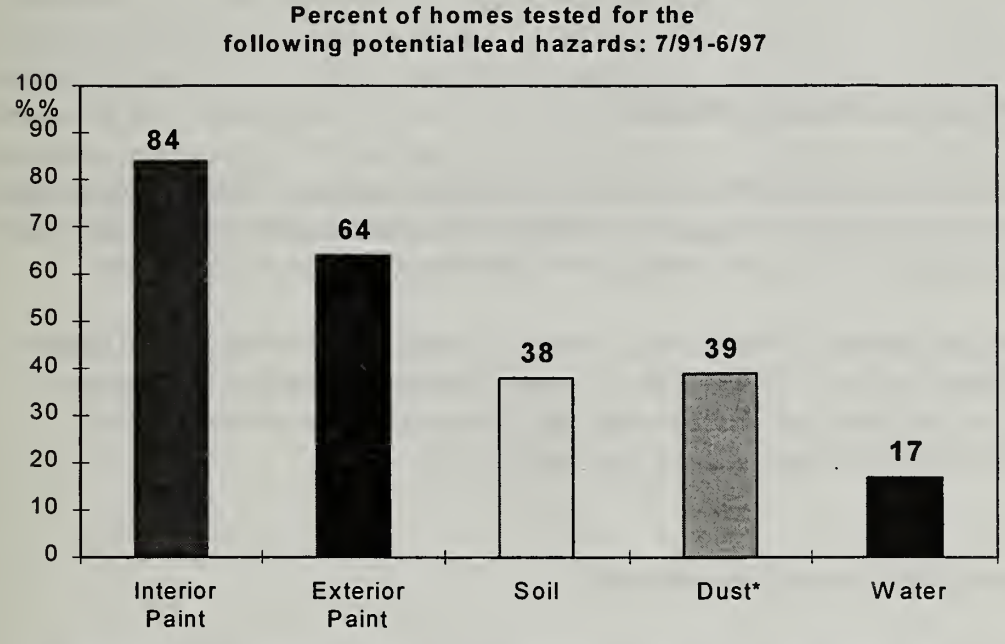
The questionnaire is used to determine the age of the house, where the child spends most of his/her time in the home, and whether any recent renovation or remodeling has been done that involved sanding, scraping, or burning of lead-based paint.

How many samples are collected at each site?

From 7/91-6/97, a total of 1,670 environmental samples were collected. The number of samples collected per site ranged from 1 to 35, depending on paint and soil conditions, with an average of 9 samples collected per site.

What is the most common type of sample collected?

The most common type of sample collected was interior paint (collected in 84% of all homes investigated), followed by exterior paint (64%), dust* (39%), soil (38%) and water (17%).



**Lead dust hazards were not regularly collected until 1995 when the DPH was able to establish an account with the SFDPW Water Pollution Control Lab.*

Determining the amount of lead in paint, dust, and soil

How is the amount of lead in paint determined?

There are two ways to analyze the amount of lead in paint: XRF (x-ray fluorescence) and AA (Atomic Absorption) analysis. AA analysis requires the collection of a small paint chip sample that includes all layers of paint down to the substrate of the surface being tested. After the paint sample is collected, it is sent to a laboratory for analysis. The majority of samples from DPH investigations were analyzed by AA; therefore, only the analysis of AA results are included in this report. The units for this test are parts per million (ppm) or milligrams of lead per kilograms of sample (mg/kg).

How is the amount of lead dust determined?

Dust samples can be collected using either a wet wipe or a special vacuum. Wipe sampling is the preferred method of dust collection because it is simple and inexpensive. Additionally, dust wipe sampling results have been found to correlate well with blood lead levels in children.

In order to determine the amount of lead in dust, a wipe of an area of approximately one square foot of a hard, horizontal surface is collected and sent to a laboratory for analysis. Areas most frequently sampled for lead dust include floors and interior and exterior windowsills. Dust sample results have units of micrograms per square foot ($\mu g/ft^2$).

How is the amount of lead in soil determined?

Soil samples are most often collected as a composite sample of a selected area. A number of equal subsamples are collected throughout the area being sampled, placed into a jar or plastic baggy, and then sent to the lab for analysis. Soil areas commonly sampled for lead include: children's play areas, building foundations or drip lines, vegetable gardens, bare pathways, and sandboxes. Soil lead concentrations are expressed in parts per million (ppm).

Using Environmental Data as an Estimator of Risk/Exposure

How can we use environmental data to estimate a child's risk of lead poisoning?

An investigation of a lead poisoned child's home is done to not only identify possible sources of lead, but also to determine the child's most likely sources of high-dose exposure to lead. While a number of samples of a particular type may be collected, i.e. soil, the sample with the highest value is of particular interest to the environmental investigator because it is the best estimator of the highest potential level of lead exposure that the child has had.

Worst-case levels were used for this analysis rather than average levels per site for two reasons. The main reason for not using averages is that they are not indicative of a child's interaction with his/her environment; therefore, they can be misleading. Furthermore, it is impossible to determine how much of child's elevated blood lead level can be attributed to a specific environmental source. By looking at the highest level of lead that a child was exposed to (by each potential source, i.e. interior paint), we can estimate a worst-case scenario; hence the use of "worst-case" levels by source per site instead of averages.

Lead in Paint

What is lead-based paint (LBP)?

Lead-based paint is any paint, varnish, stain, or other applied coating that has a lead content greater than or equal to 5,000 parts per million (also expressed as ≥0.5% lead by weight). In the remainder of this report, this definition will be referred to as the "acceptable level" of lead in paint, even though no health criteria were used to establish this definition.

One limitation of the above definition is that paint with a lead content below 5,000 ppm still contains lead in amounts that can cause health hazards. A classic example of this is when walls that have levels of lead below the definition of lead-base paint are dry sanded. Despite the fact that the lead paint levels were "acceptable," the sanding will result in very high levels of lead in dust on the floors, windowsills, etc.

When is lead-based paint a hazard?

Lead-based paint may be a hazard if it is:

- Flaking, peeling, or chipping
- On a friction or impact surface (i.e. windows, doors, floors)
- On a child-accessible, chewable surface (i.e. a windowsill)
- Disturbed through remodeling or renovation activities such as dry scraping, sanding, pressure blasting, or burning.

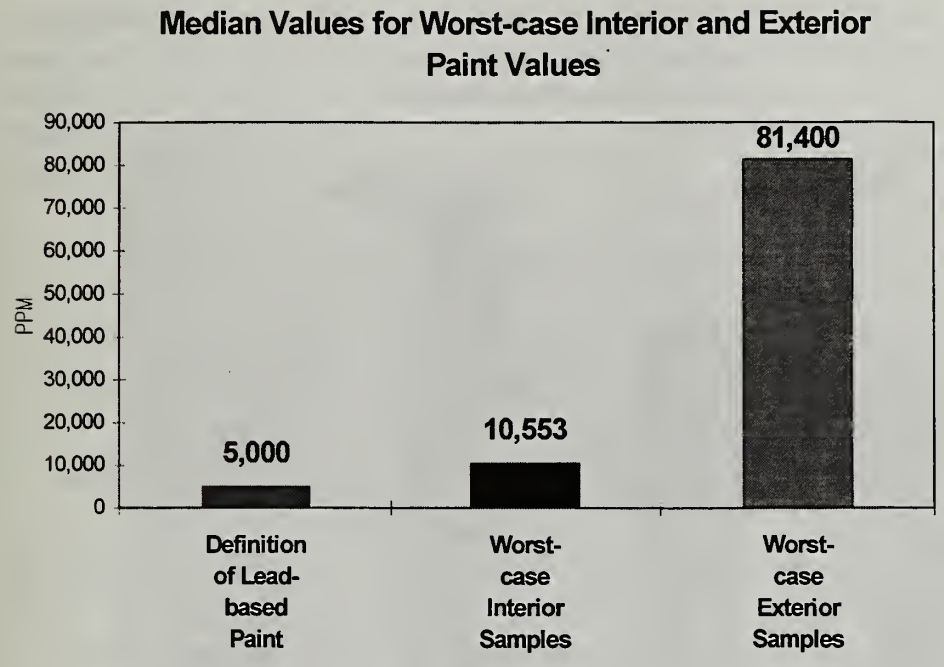
Interior versus Exterior Paint

What does analysis of worst-case levels of interior and exterior paint show?

The majority of both interior and exterior worst-case paint levels were greater than the definition of lead-based paint, and most, if not all, of these samples involved lead-based paint in a hazardous condition. Not surprisingly, the analysis also revealed that exterior paint is more likely to have a greater than acceptable amount of lead than interior paint (85% of worst-case exterior levels were ≥ definition of lead-based paint, versus 68% of interior levels).

In order to further evaluate the worst-case levels of lead in exterior and interior paint, median values were calculated for each. The median is the middle value in a distribution, meaning that half of the values in the distribution are greater than the median and half are less than the median.

For all worst-case exterior paint levels, the median value was 81,400 ppm. This means that fifty percent of the worst-case exterior paint levels were greater than 81,400 ppm (or 8% lead), sixteen times the definition of lead-based paint. The highest content of lead measured in an exterior paint sample was 493,390 parts per million or 49% lead.



Fifty percent of worst-case interior paint samples were greater than 10,553 parts per million (>1% lead). This value is twice the value of the definition of lead-based paint, but it is much lower than the median value found in exterior paint levels. The highest value measured for an interior paint sample was 247,760 parts per million or 25% lead.

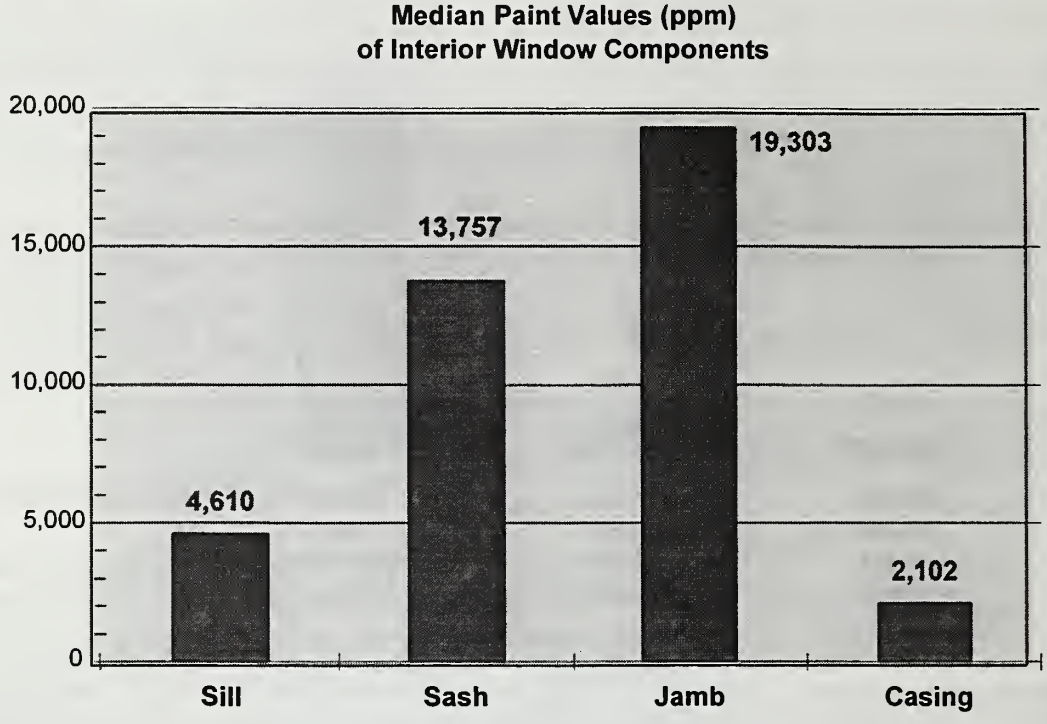
Interior Surfaces/Components

Which interior paint surfaces caused problems?

Worst-case samples of windows, doors, and walls were evaluated to determine where interior lead-based paint hazards are most likely to be found. Of the three surfaces evaluated, doors had the highest median value (50% of worst-case interior door samples were >9,823 ppm) and windows had the second highest median value (50% of worst-case interior window samples were >7,227 ppm). These median values are 2 and 1.5 times greater (respectively) than the definition of lead-based paint. The median lead concentration of worst case interior wall samples was less than the definition of lead-based paint.

What interior window parts are most likely to cause problems?

An examination of the different parts of windows that were sampled revealed that the friction surfaces, namely window jambs and sashes (see Figure 1), had median values 3-4 times greater than the definition of lead-based paint, whereas sills and casings had median values less than or equal to 5,000 ppm.

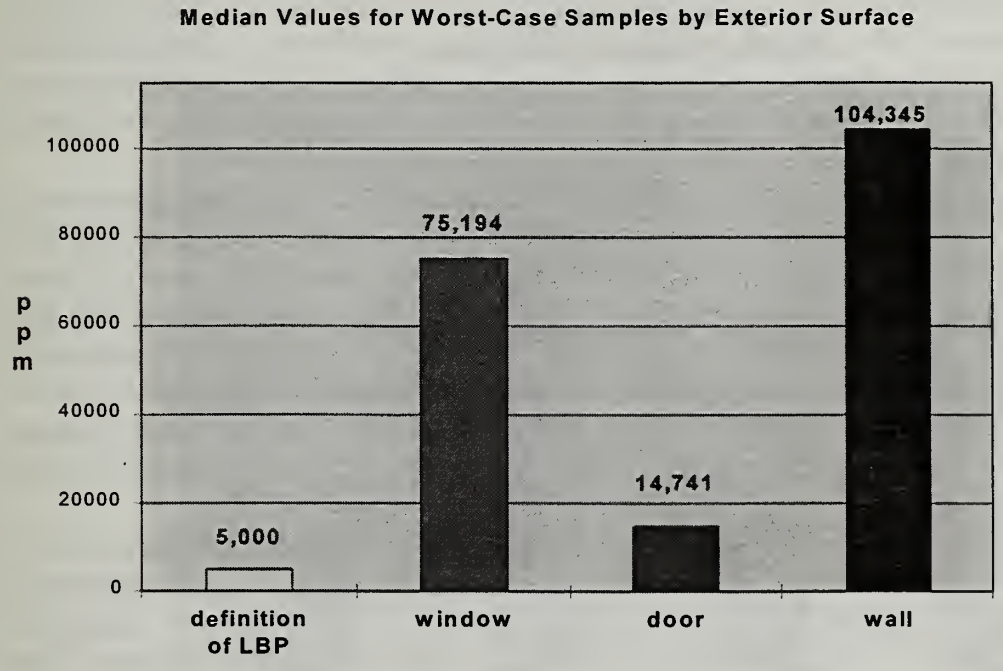


Overall, over three quarters of the worst-case samples from friction surfaces (sash and jamb components) were greater than 5,000 ppm (vs. 50% of sills and 38% of frames). When these components rub together they generate lead dust. Because lead dust is heavy it tends to settle on the parts of the window that are below the sash and jamb components, especially on the interior and exterior windowsills and in exterior window troughs.

Exterior Surfaces/Components

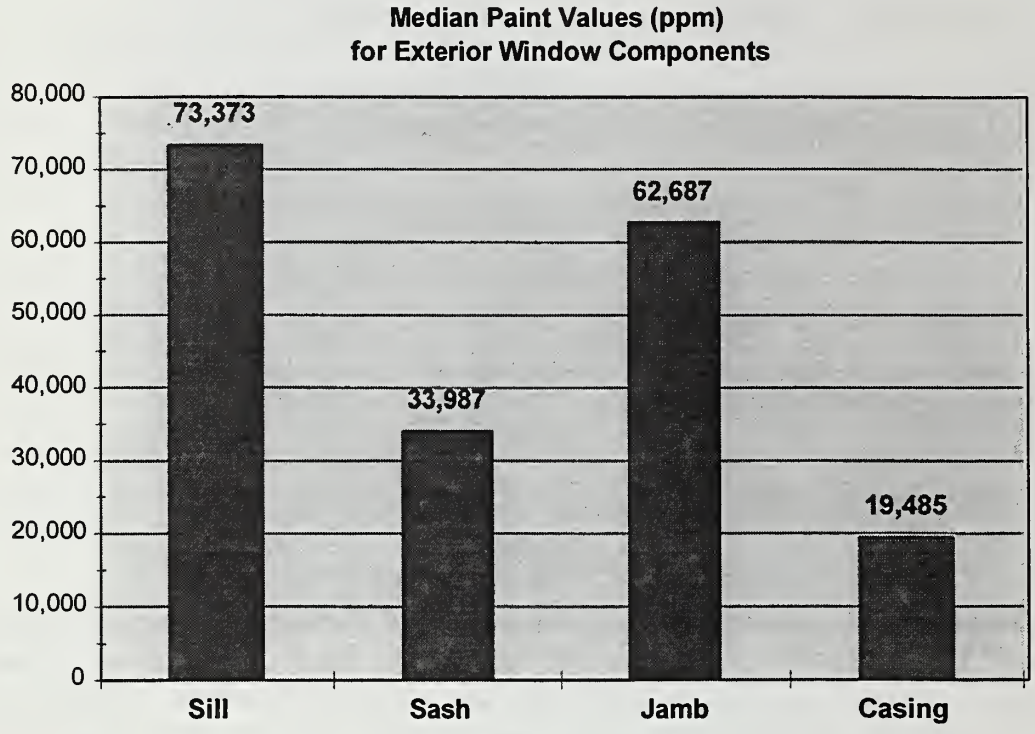
Which exterior paint surfaces caused problems?

The median values of worst-case samples for all three exterior surfaces evaluated (windows, doors, and walls) were much greater than the definition of lead-based paint. Exterior walls and windows were found to be of greatest concern due to the fact that the median values for worst-case samples from these surfaces were 21 and 15 times greater than the definition of lead-based paint respectively.



What exterior window parts are most likely to cause problems?

Analysis of the different exterior parts of windows showed a different trend than that of interior window parts. Median values for worst-case samples from the friction surfaces were very elevated, but the highest median value for an exterior window surface was for exterior sills, which had a median value 15 times greater than the definition of lead-based paint. Lead-based paint was frequently used on exterior wood components to preserve them. The paint on exterior windowsills is often in very poor condition due to the sun and rain, and the deteriorated paint easily degenerates into hazardous lead dust. The same is likely true for other exterior window



components as well. Overall, 64 to 100% of the worst-case exterior sill, sash, jamb, and casing samples were ≥5000 ppm.

Lead in Dust

What is lead-contaminated dust and where does it tend to be a problem?

Lead-contaminated dust is generated as lead-based paint deteriorates over time, is abraded on friction or impact surfaces (such as doors and windows), or is disturbed during renovation, repair, or remodeling projects. Large amounts of lead dust can be created when lead-based paint is dry scraped, dry sanded, or burned. Lead dust can also be tracked into homes from lead-contaminated exterior dust and soil.

Children can be easily poisoned through the ingestion of lead-contaminated dust when they put their hands, toys, or other objects contaminated with lead dust into their mouths. The child accessible surfaces where lead dust is likely to accumulate and be hazardous include interior and exterior windowsills and floors.

Dust samples were not routinely collected by the DPH until the middle of 1995 due to limitations in the ability to have dust samples analyzed. Only 40% of the environmental investigations conducted from 7/91 to 6/97 included dust sample results. Of the dust samples analyzed, almost 50% of worst-case interior floor and windowsill samples had lead levels that were greater than acceptable according to the HUD Action Levels[†]. Over 40% of worst-case exterior floor samples and 67% of worst-case exterior windowsill samples were greater than the action level. Exterior windowsills had a median lead-dust level over twice the median of interior windowsills, a fact that can be attributed to the higher levels of lead in exterior paint.

[†]US Department of Housing and Urban Development Action Levels are as follows: "lead-contaminated floor" - greater than or equal to **100 ug/ft^2** (interior)/ **800 ug/ft^2** (exterior) (ug/ft^2 = micrograms per square foot); "lead-contaminated window sill" - greater than or equal to **500 ug/ft^2** (interior)/**800 ug/ft^2** (exterior).

Lead in Soil

Where was lead-contaminated soil found to be a problem?

Lead-contaminated soil can be a direct source of exposure for children through hand-to-mouth activity and it can contribute to indoor lead dust levels when it is tracked into a home. The most common sources of lead in residential soil include deteriorating exterior lead-based paint from houses, renovation or remodeling of exterior paint surfaces without adequate containment of lead dust and debris, and the past use of leaded gasoline.

Soil samples were collected in environmental investigations whenever there was a soil area in or around the home that was accessible to and/or used by children. Bare soil areas are of greater concern than soil areas that are covered with plants, grass, or some other barrier due to the higher amount of contact children have with the dirt and its lead contaminants if the soil is bare.

Less than 40% of the homes investigated, had a soil area that was accessible to and/or used by children. The median values for both bare soil samples (627 ppm) and for covered soil samples (519 ppm) were both greater than the acceptable level of lead in soil (400 ppm). Around 60% of both bare and covered soil samples were greater than 400 ppm. The biggest difference between the two was in the maximum level of lead observed, which was 3,560 ppm for covered soil and 15,938 ppm for bare soil, respectively 9 and 40 times greater than the acceptable level of lead in soil.

Lead in Water

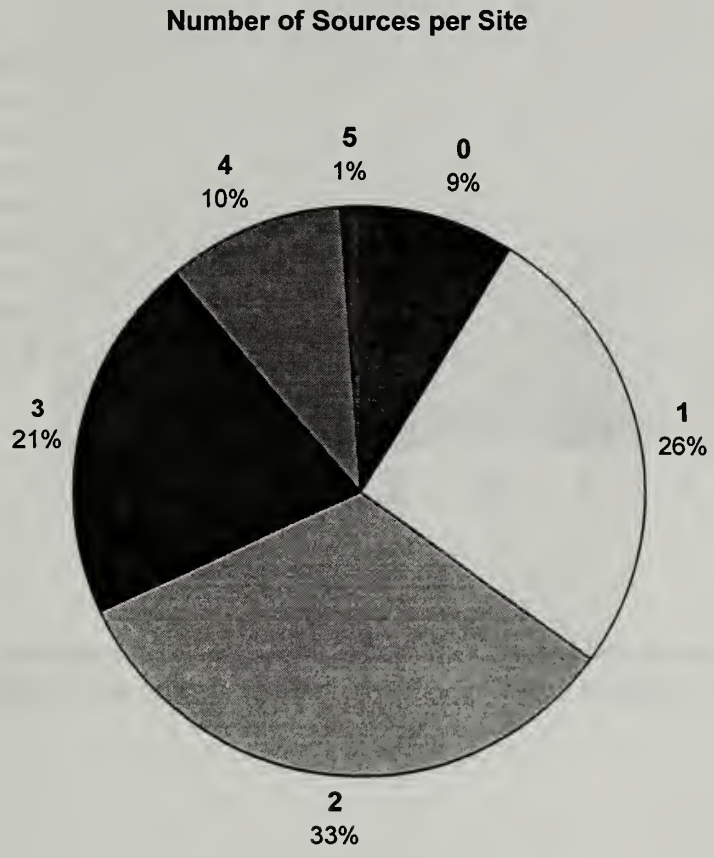
Monitoring of lead in water is conducted by the Environmental Protection Agency (EPA) and implemented at the community level. Therefore, water sampling is not required for routine lead-based paint risk assessments, although it may be requested by the tenant or owner.

Water samples were collected during a limited number of case investigations, most often at the request of the family or the PHN. Of the 173 sites investigated, only 30 (17%) had water samples collected and tested for lead. Of these 30 sites, not one had a level of lead greater than the EPA action level of 15 parts per billion (ppb). The median value of lead in water for all sites tested was 3 parts per billion (ppb), a value which is one-fifth the EPA action level.

Environmental Source Identification

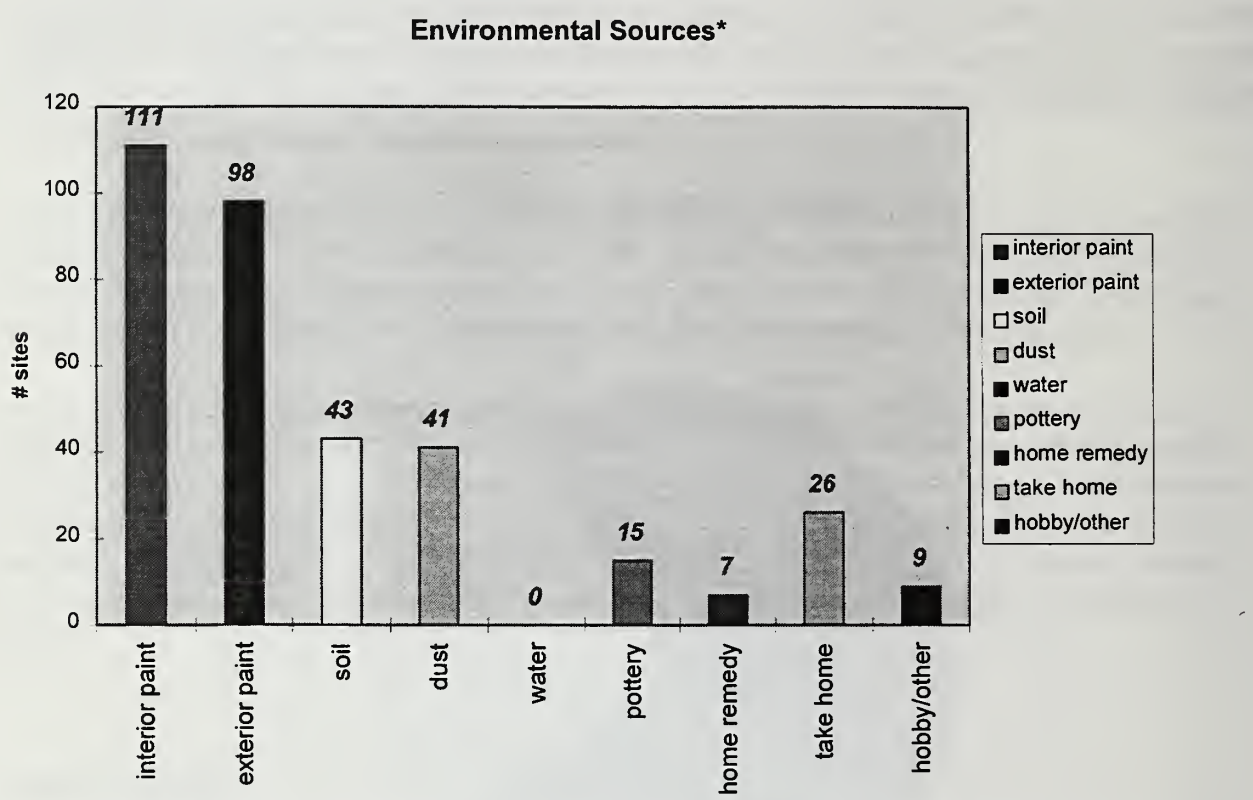
In how many homes was an environmental source identified?

Environmental sources include lead-based paint, lead contaminated dust, lead contaminated soil, home remedies, pottery, take home exposure, and hobbies/other. In 91% of the investigations done by the DPH from 7/91-6/97, at least one environmental source was identified. Two or more environmental sources were identified in 65% of the environmental investigations.



Of the 15 sites investigated where no lead source was identified, ten involved cases where the child was exposed at a previous residence, in another country, or at an alternate site. In only five sites (<3% of all sites investigated), no source or probable cause of lead poisoning was identified.

A high percentage of homes had at least one interior lead-based paint hazard (64%) and/or a exterior lead-based paint hazard (57%). A lead soil hazard was identified in 25% of the homes investigated. Other hazards identified by percentage of homes include: dust (24%), pottery (9%), home remedies (4%), and hobby/other (5%). Lead in water hazards were not identified at any of the sites investigated.



* A particular site may represented in more than one bar of this graph. For example, if a site had both a soil hazard and a pottery source it would appear in both the bar for soil and the bar for pottery.

Discussion

San Francisco County ranks first among all counties statewide in the percentage of homes built before 1950 (68% of all housing units). All pre-1950 homes are assumed to contain lead-based paint, and are likely to have related lead dust and soil hazards. Therefore, it is not surprising that this analysis demonstrated median values of worst-case interior and exterior paint samples for sites investigated in San Francisco that are 3-4 times greater than those found in a similar analysis of data from all sites investigated statewide.

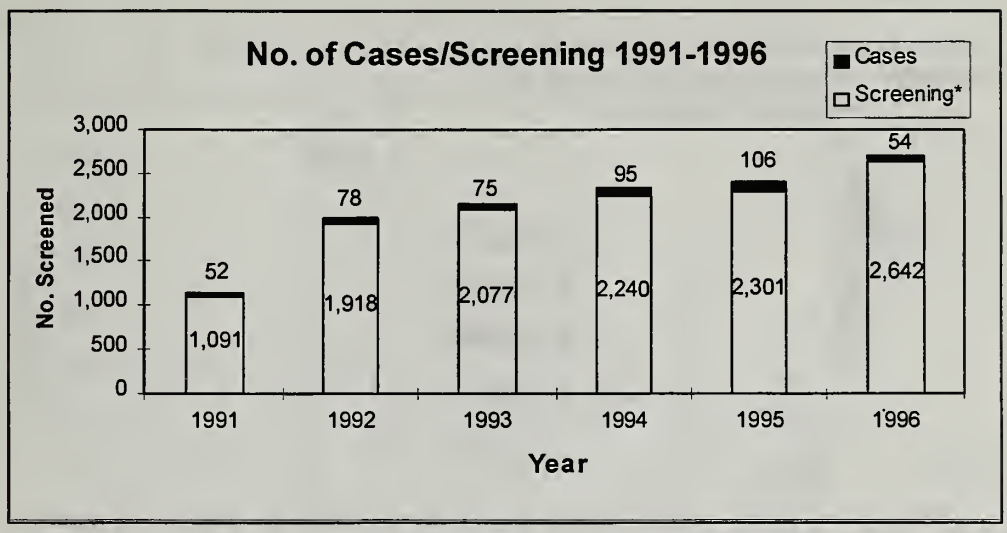
A very strong correlation between elevated blood lead levels (≥20μg/dL) and pre-1950 housing children was found in a previous study (*SF Epidemiologic Bulletin* 1995). The overwhelming majority (90%) of the sites included in this analysis were built before 1950.

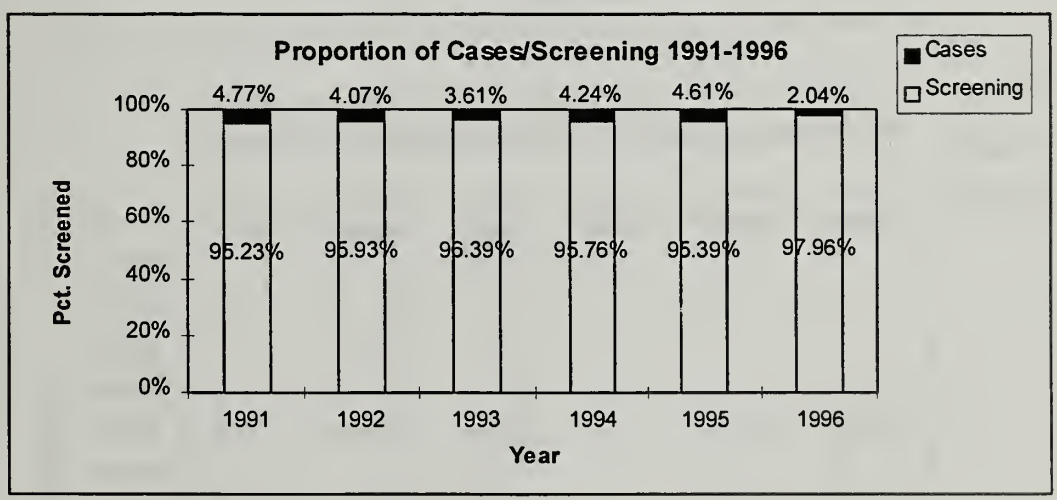
Attachment

San Francisco Childhood Lead Prevention Program
Data Report 1991-1996

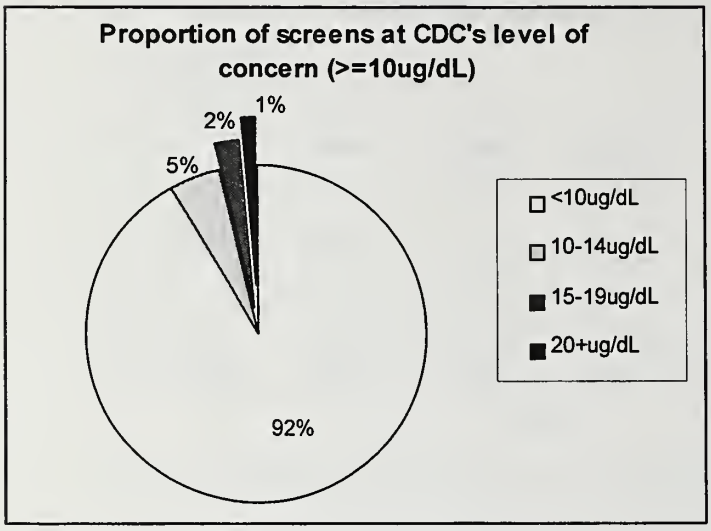
* In all graphs, the screening total indicated includes those tests which resulted in cases. In all graphs cases are defined ⇩15µg/dL.

Screening and Case Finding Trends per Year

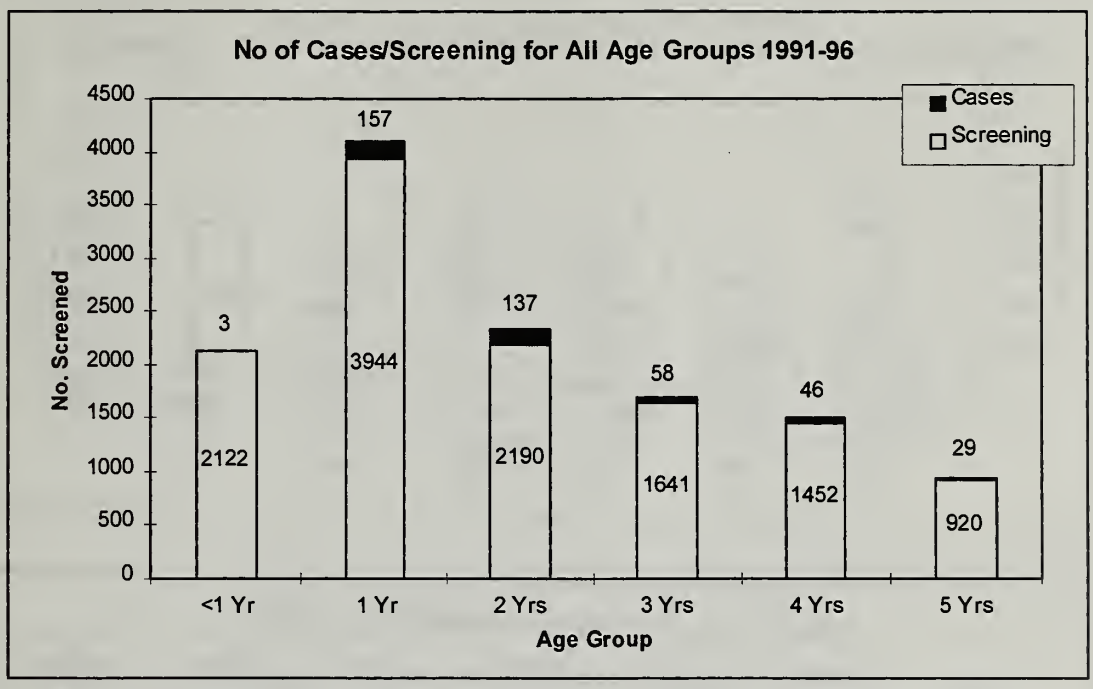


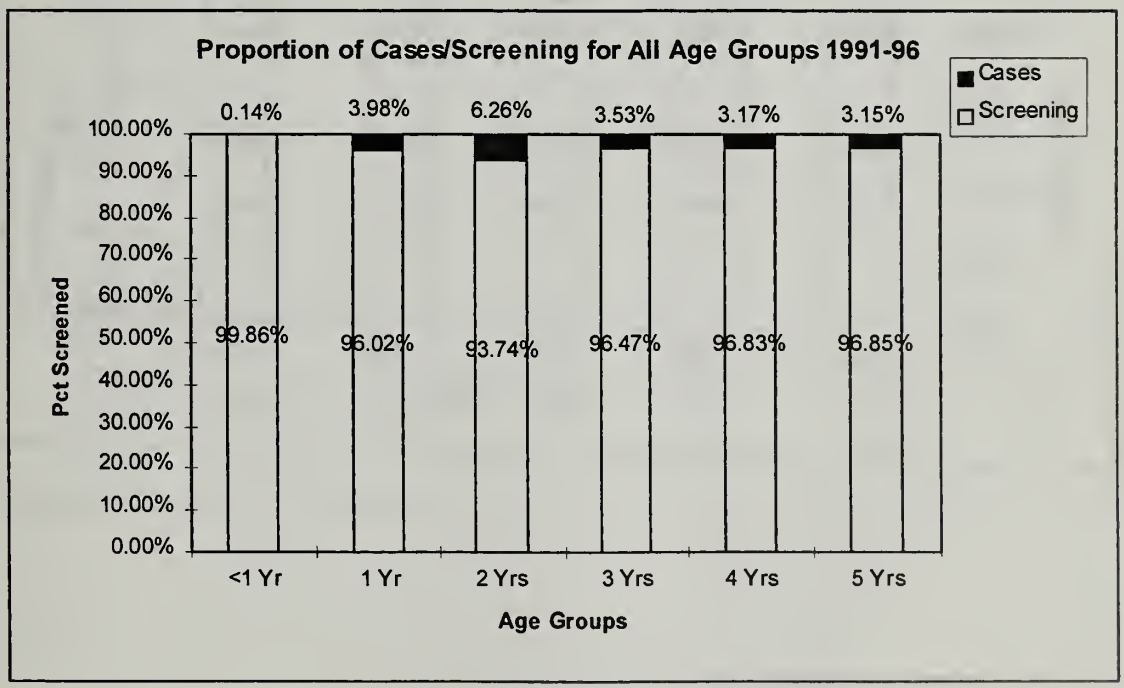


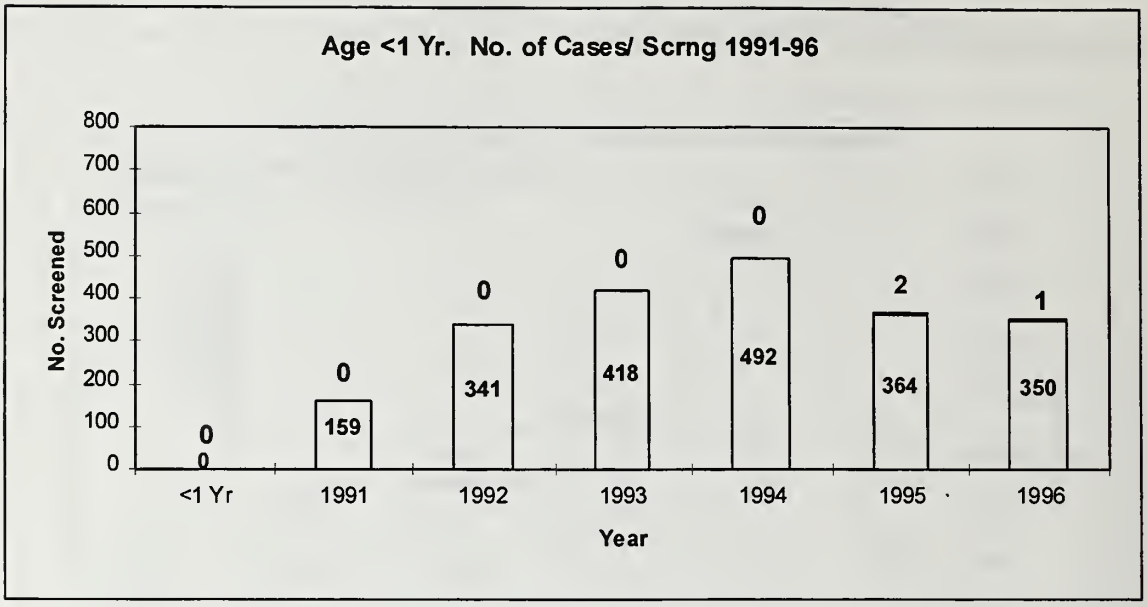
Proportion of Screens at CDC's Level of Concern (≥10µg/dL)

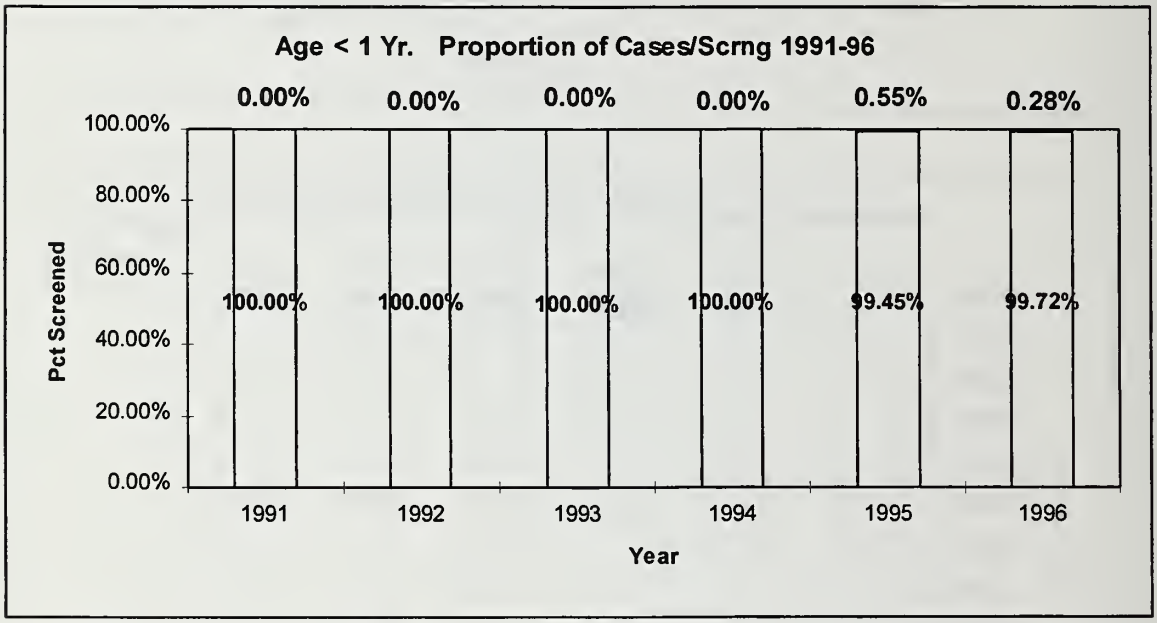


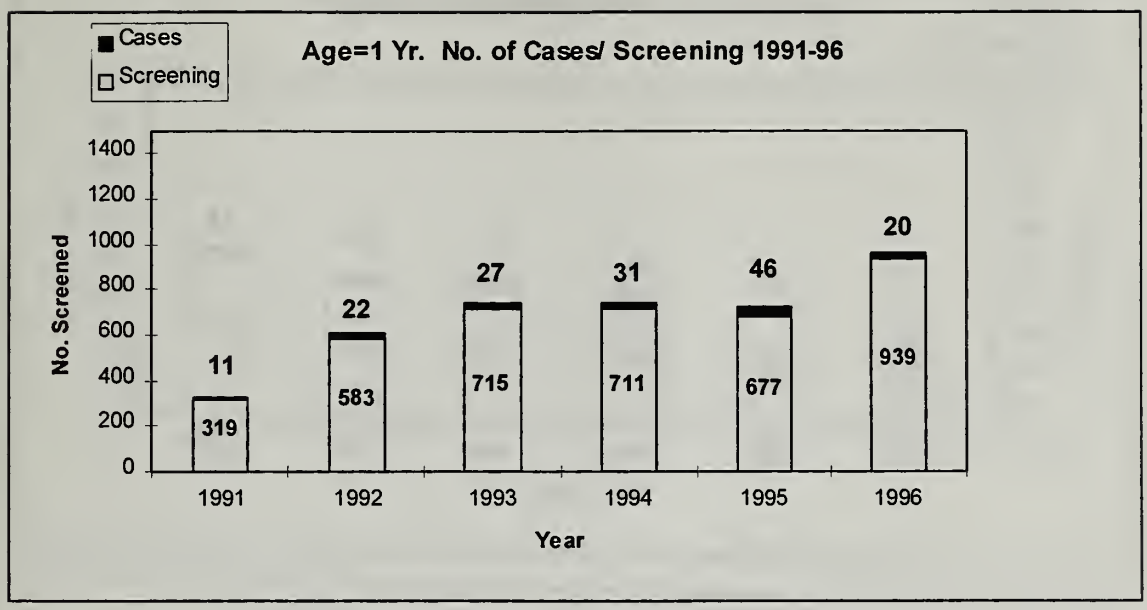
Age Analysis

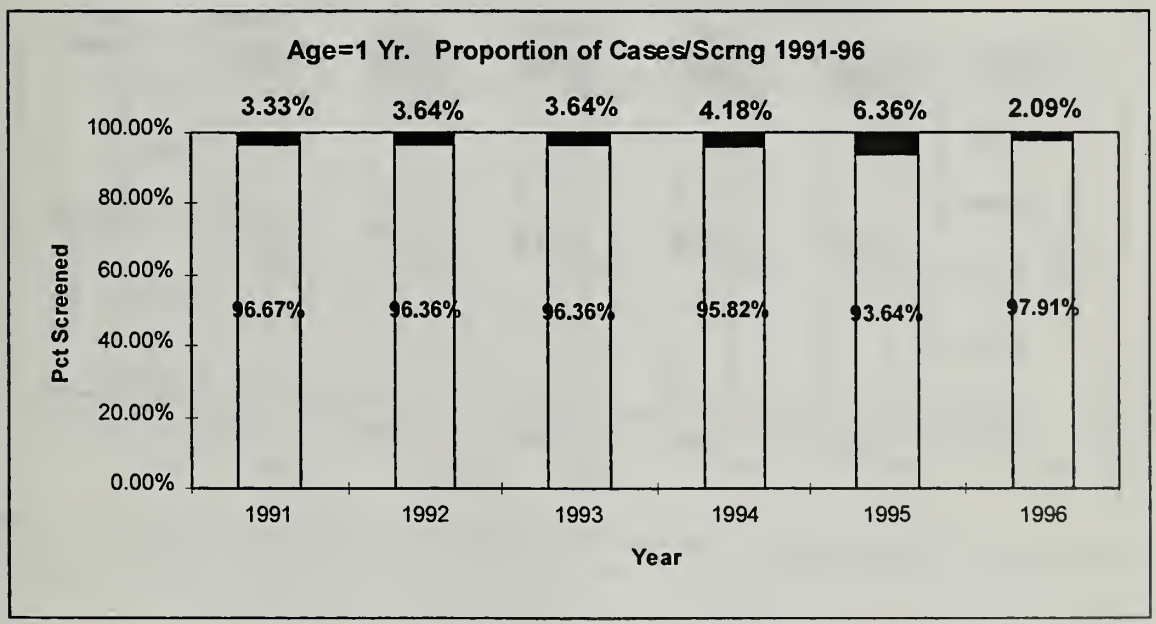


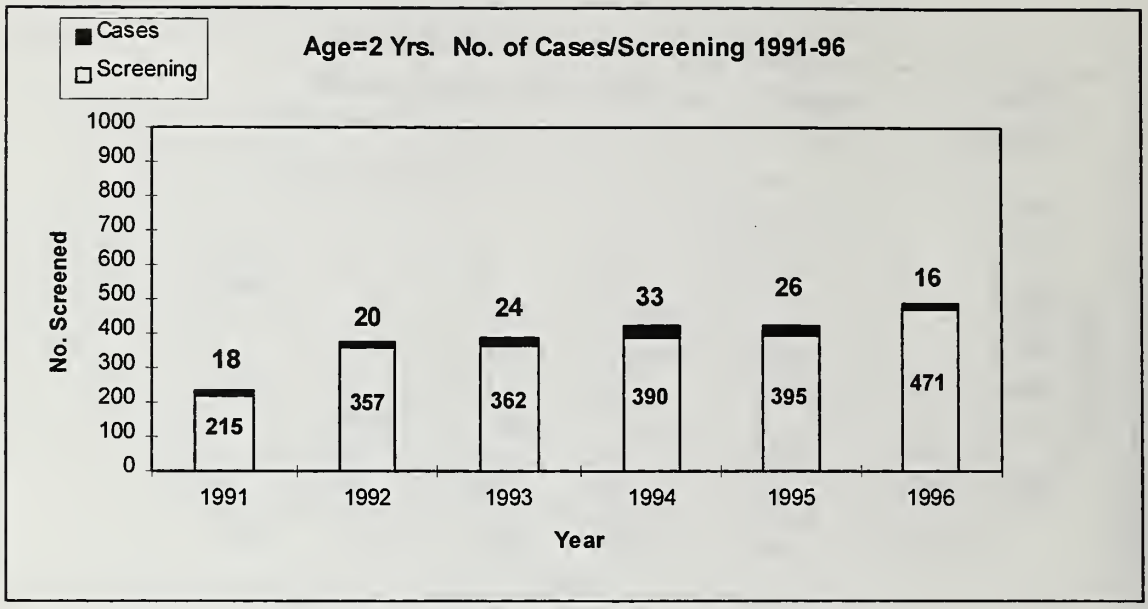


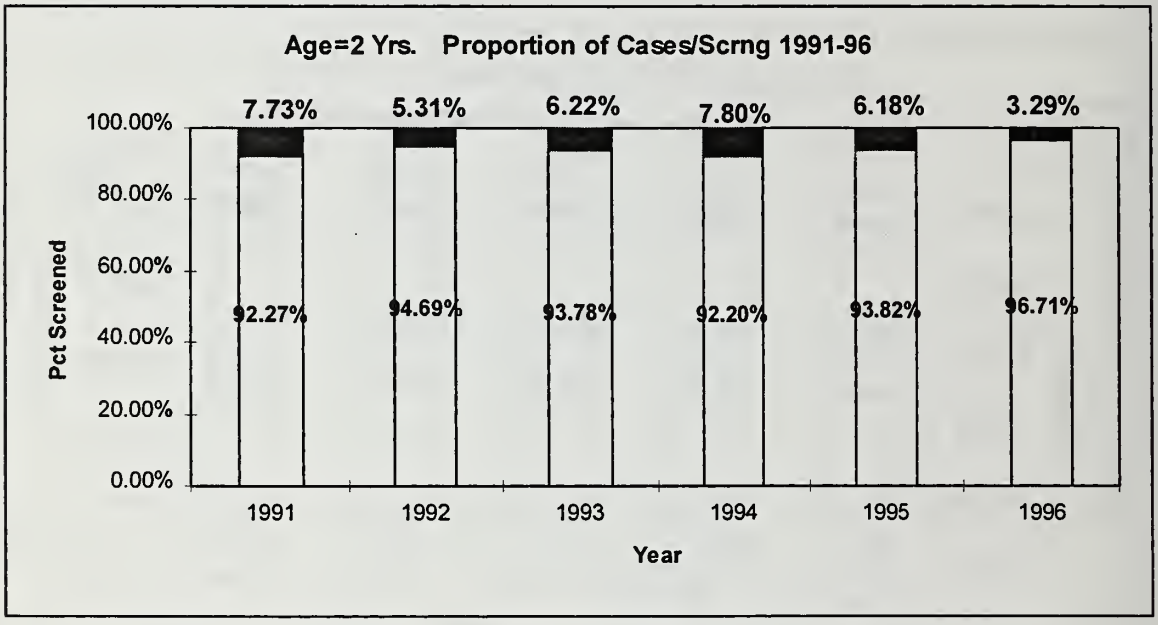

Age <1 Yr. No. of Cases/ Scrng 1991-96
No. Screened
800
700
600
500
400
300
200
100
0
0
0
0
159
0
341
0
418
0
492
2
364
1
350
<1 Yr
1991
1992
1993
1994
1995
1996
Year

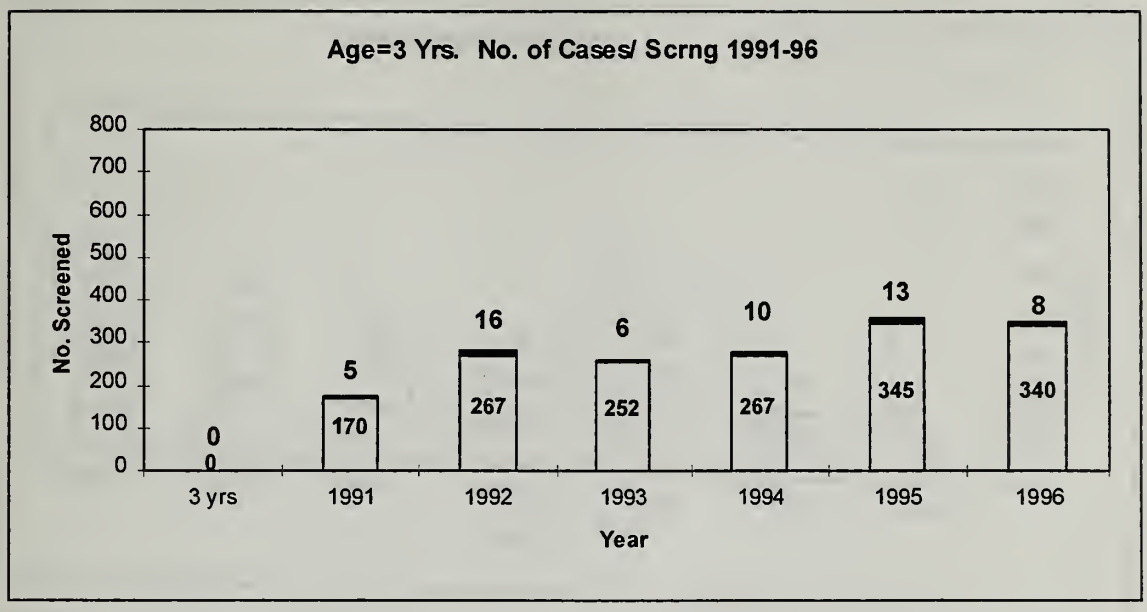

Age < 1 Yr. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.55%
0.28%
100.00%
100.00%
100.00%
100.00%
99.45%
99.72%
1991
1992
1993
1994
1995
1996
Year

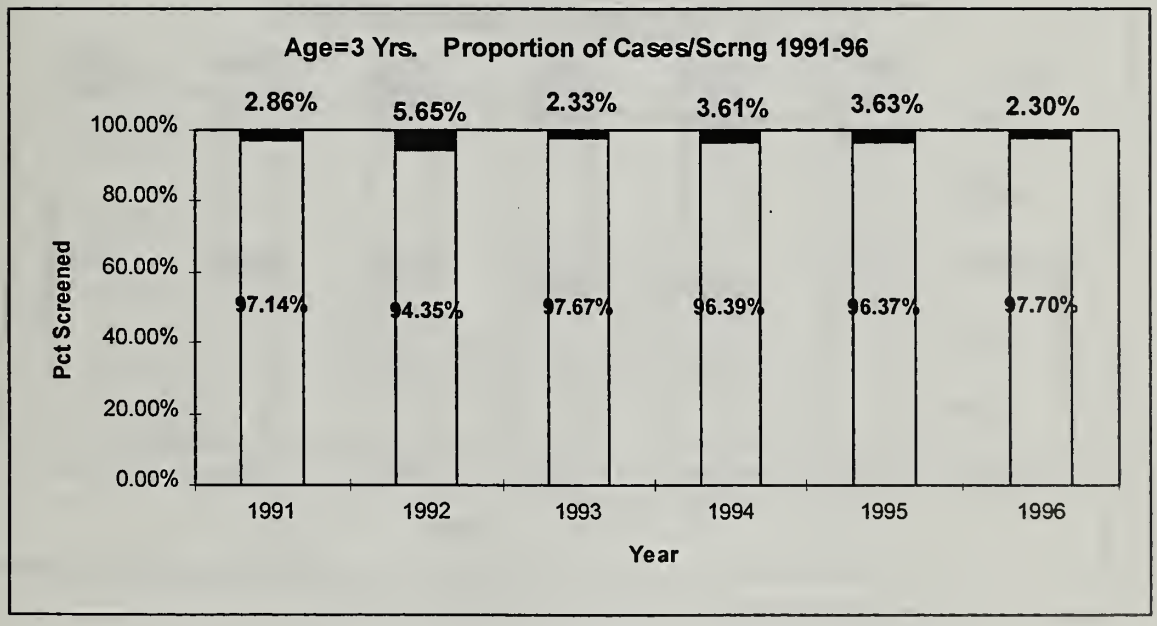

Cases
Screening
Age=1 Yr. No. of Cases/ Screening 1991-96
No. Screened
1400
1200
1000
800
600
400
200
0
11
319
22
583
27
715
31
711
46
677
20
939
1991
1992
1993
1994
1995
1996
Year

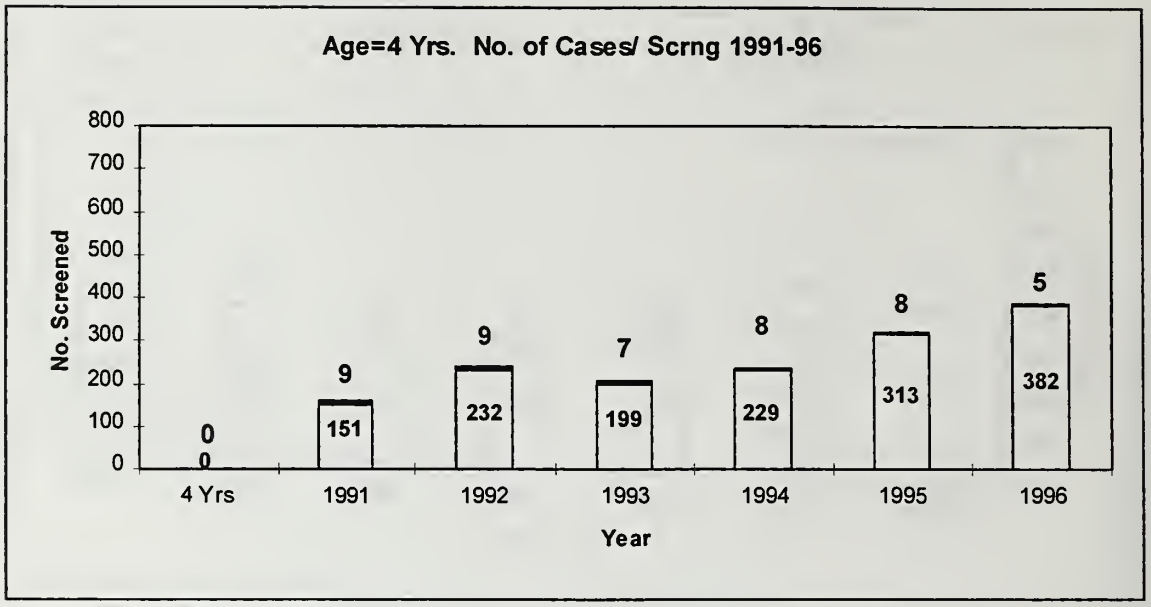

Age=1 Yr. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
3.33%
96.67%
3.64%
96.36%
3.64%
96.36%
4.18%
95.82%
6.36%
93.64%
2.09%
97.91%
1991
1992
1993
1994
1995
1996
Year

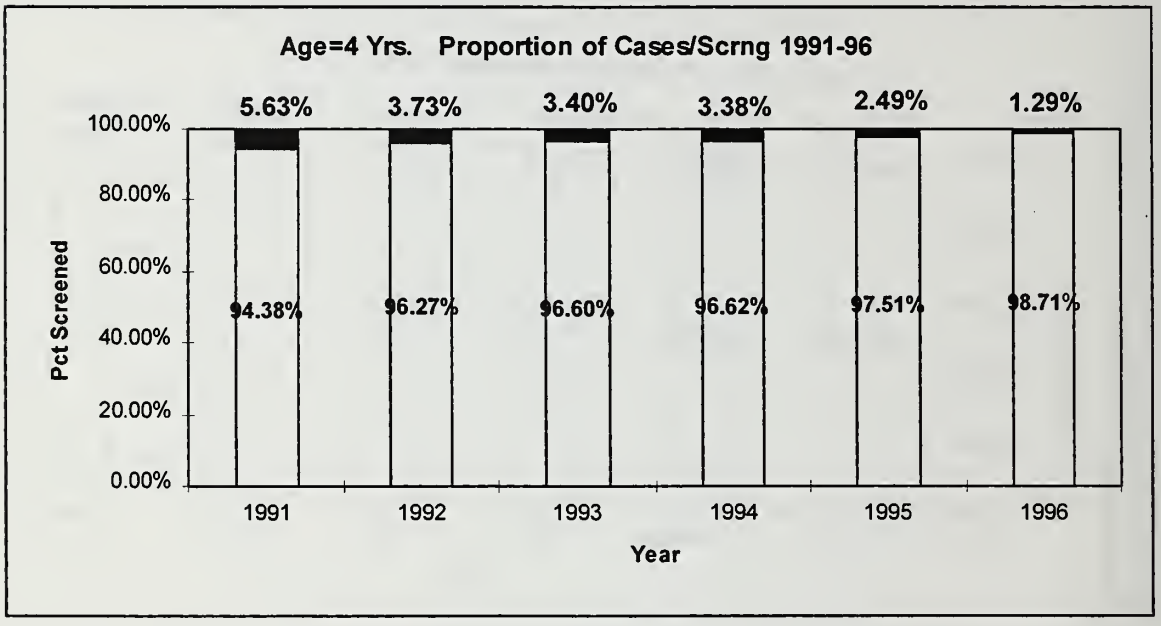

Cases
Screening
Age=2 Yrs. No. of Cases/Screening 1991-96
No. Screened
1000
900
800
700
600
500
400
300
200
100
0
18
20
24
33
26
16
215
357
362
390
395
471
1991
1992
1993
1994
1995
1996
Year

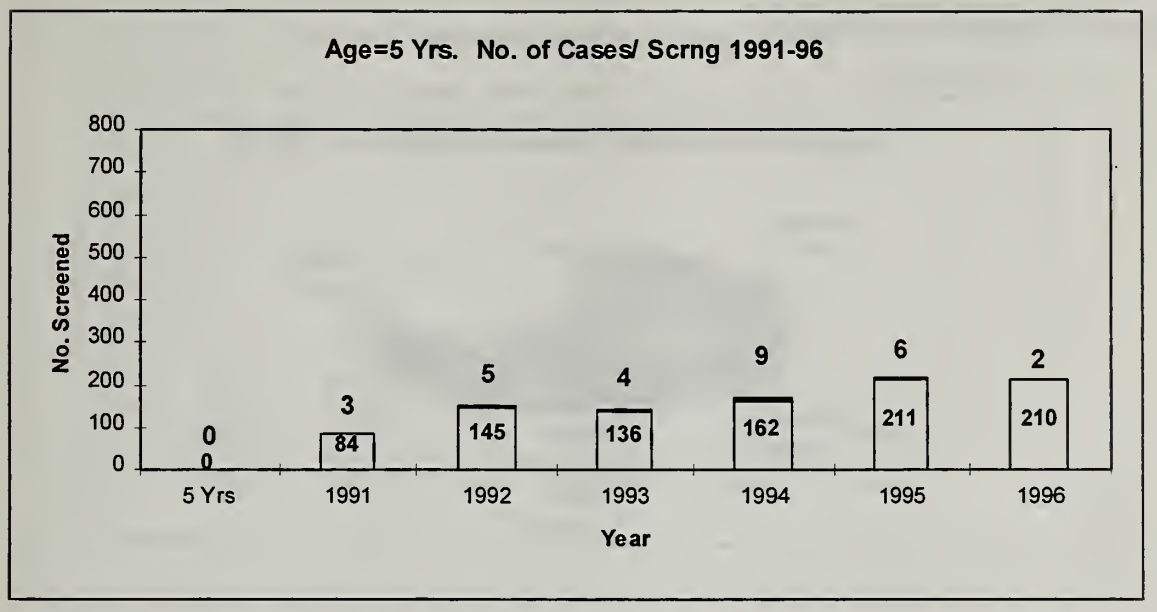

Age=2 Yrs. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
7.73%
5.31%
6.22%
7.80%
6.18%
3.29%
92.27%
94.69%
93.78%
92.20%
93.82%
96.71%
1991
1992
1993
1994
1995
1996
Year

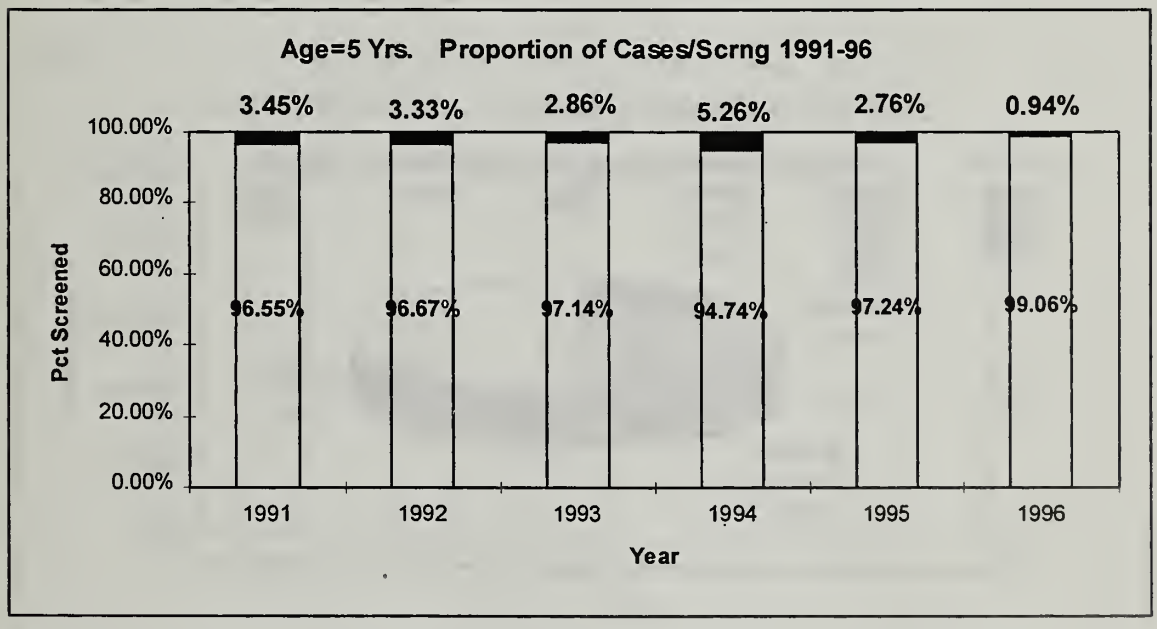

Age=3 Yrs. No. of Cases/ Scrng 1991-96
No. Screened
800
700
600
500
400
300
200
100
0
0
5
16
6
10
13
8
170
267
252
267
345
340
3 yrs
1991
1992
1993
1994
1995
1996
Year


Age=3 Yrs. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
2.86%
5.65%
2.33%
3.61%
3.63%
2.30%
97.14%
94.35%
97.67%
96.39%
96.37%
97.70%
1991
1992
1993
1994
1995
1996
Year

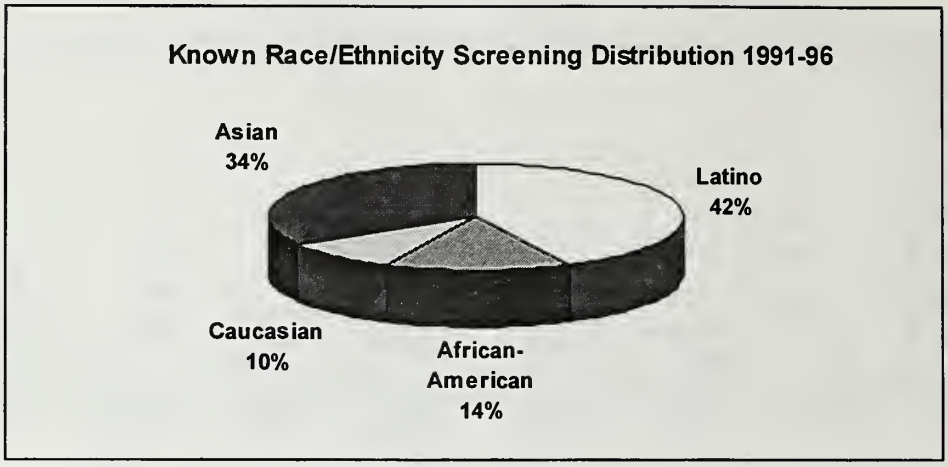

Age=4 Yrs. No. of Cases/ Scrng 1991-96
No. Screened
800
700
600
500
400
300
200
100
0
0
9
9
7
8
8
5
151
232
199
229
313
382
4 Yrs
1991
1992
1993
1994
1995
1996
Year

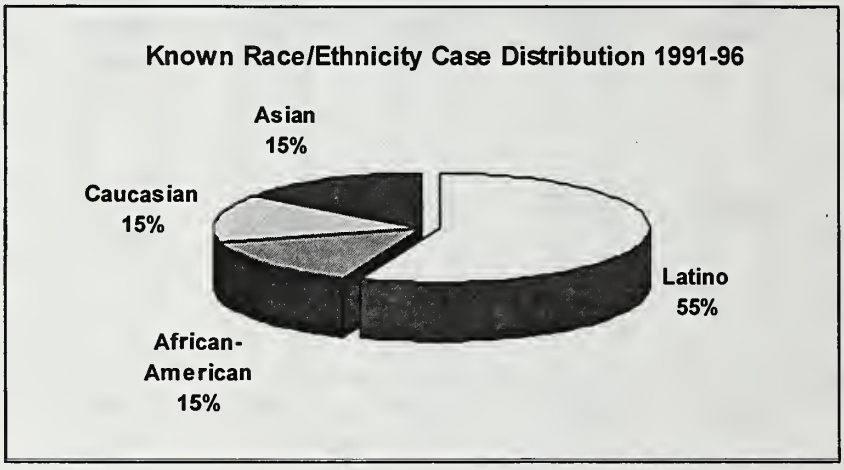

Age=4 Yrs. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
5.63%
3.73%
3.40%
3.38%
2.49%
1.29%
94.38%
96.27%
96.60%
96.62%
97.51%
98.71%
1991
1992
1993
1994
1995
1996
Year

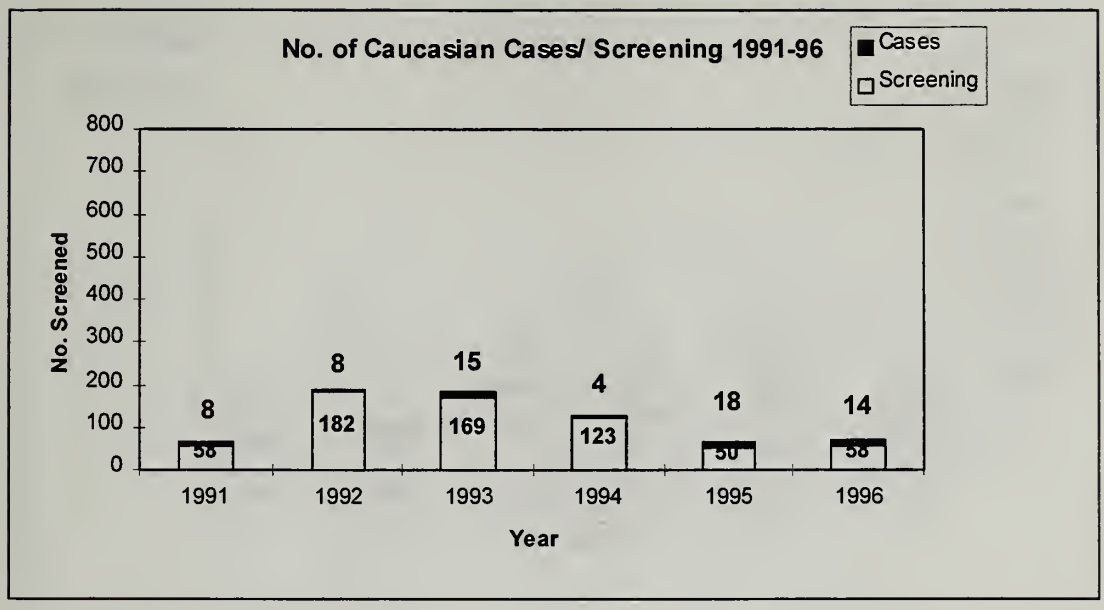

Age=5 Yrs. No. of Cases/ Scrng 1991-96
No. Screened
800
700
600
500
400
300
200
100
0
0
3
5
4
9
6
2
84
145
136
162
211
210
5 Yrs
1991
1992
1993
1994
1995
1996
Year

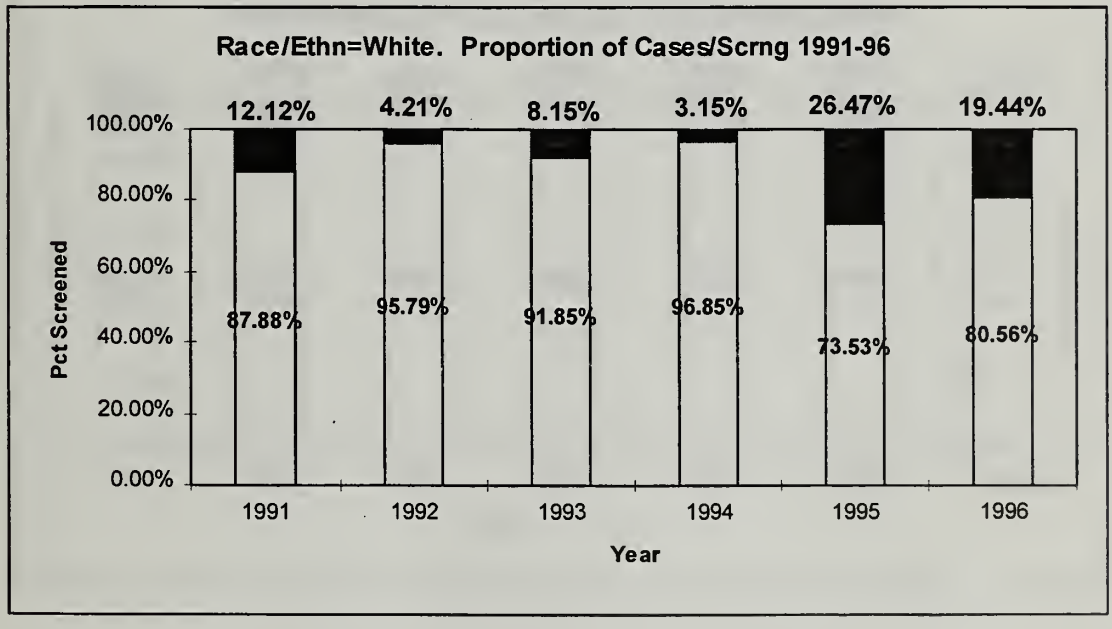

Age=5 Yrs. Proportion of Cases/Scrng 1991-96
Pct Screened
3.45%
3.33%
2.86%
5.26%
2.76%
0.94%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
96.55%
96.67%
97.14%
94.74%
97.24%
99.06%
1991
1992
1993
1994
1995
1996
Year

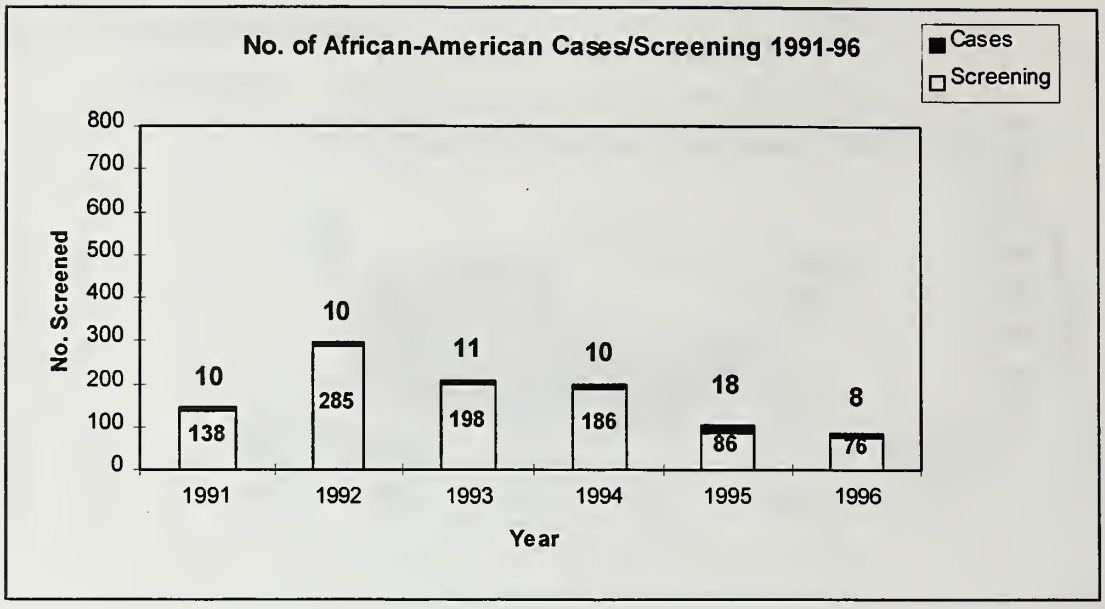
Race/ Ethnicity Analysis

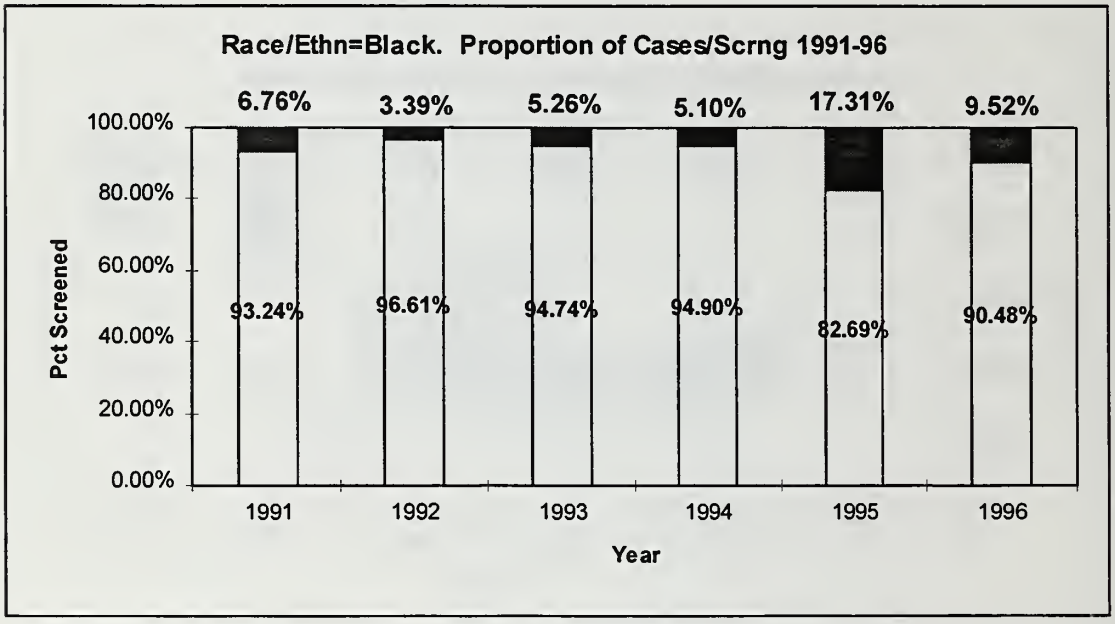


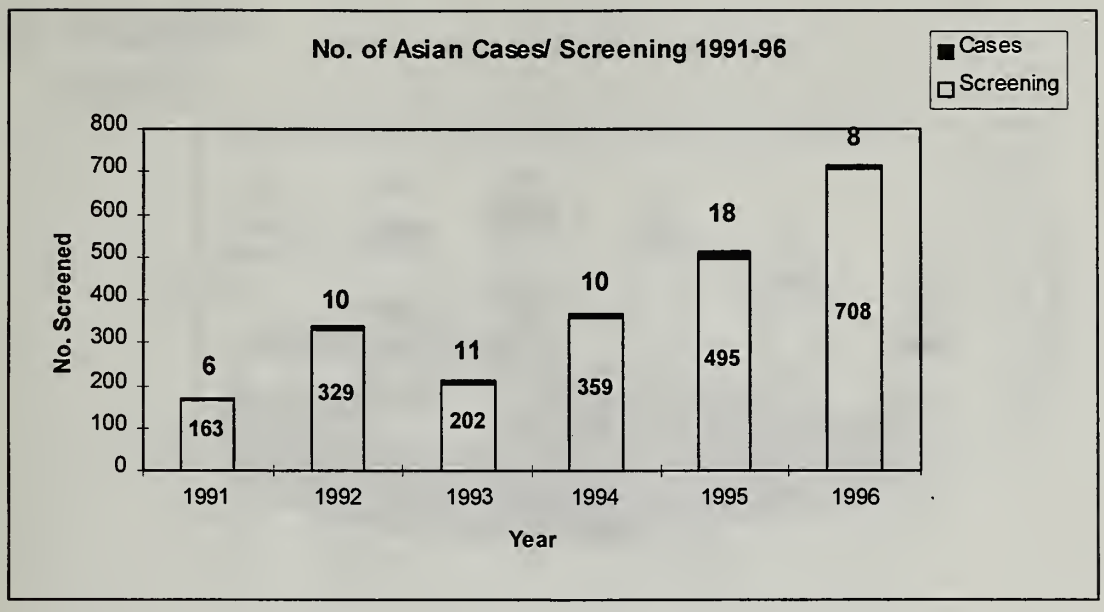


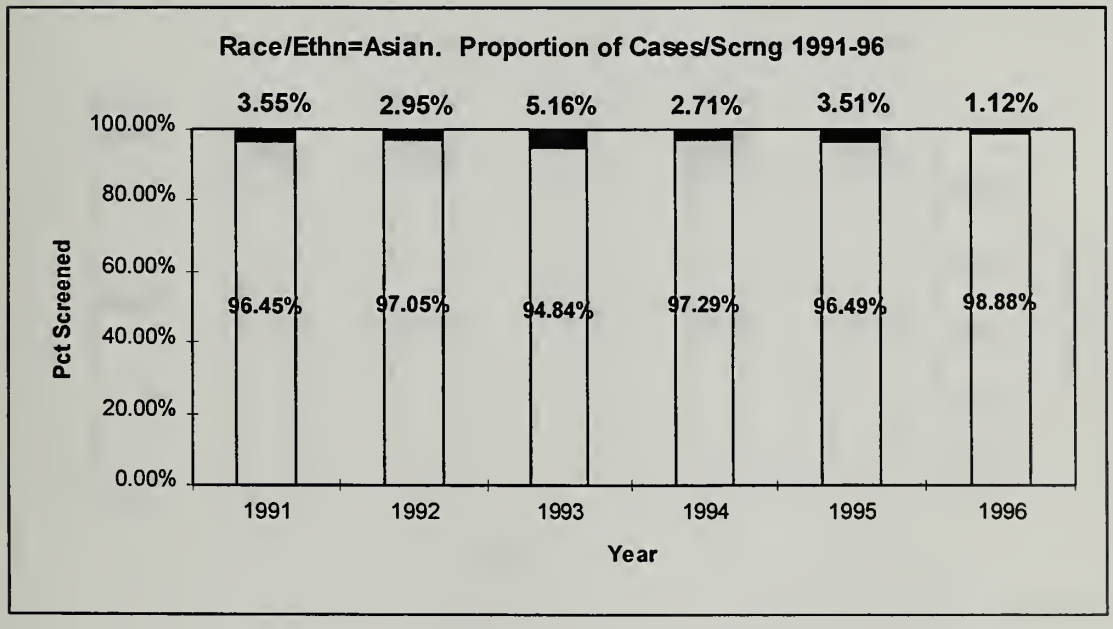

No. of Caucasian Cases/ Screening 1991-96
Cases
Screening
No. Screened
800
700
600
500
400
300
200
100
0
8
182
8
169
15
123
4
50
18
58
14
1991
1992
1993
1994
1995
1996
Year

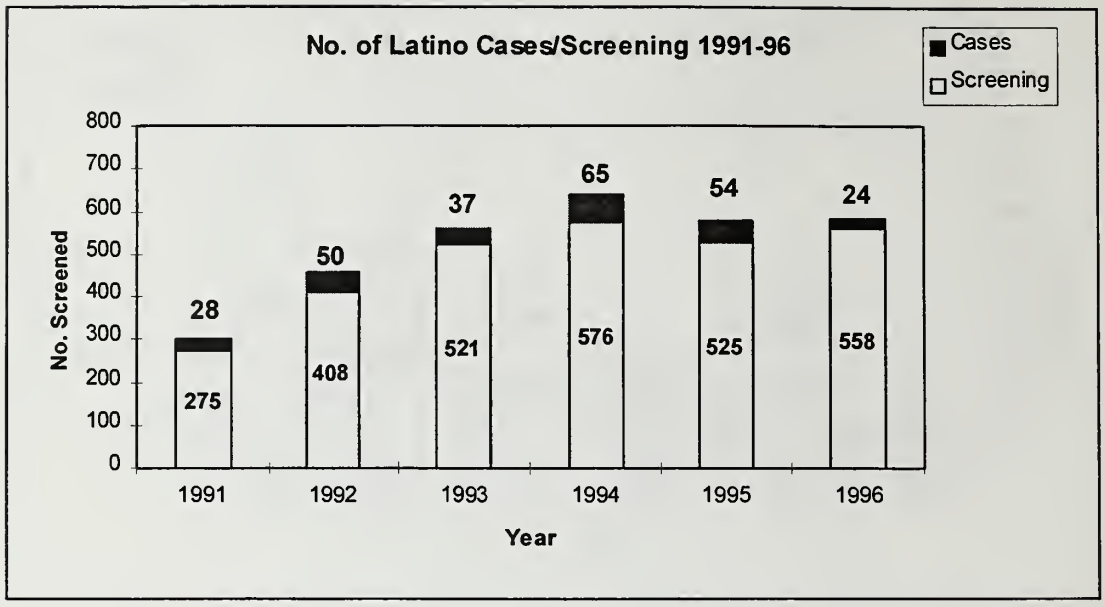

Race/Ethn=White. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
12.12%
87.88%
4.21%
95.79%
8.15%
91.85%
3.15%
96.85%
26.47%
73.53%
19.44%
80.56%
1991
1992
1993
1994
1995
1996
Year

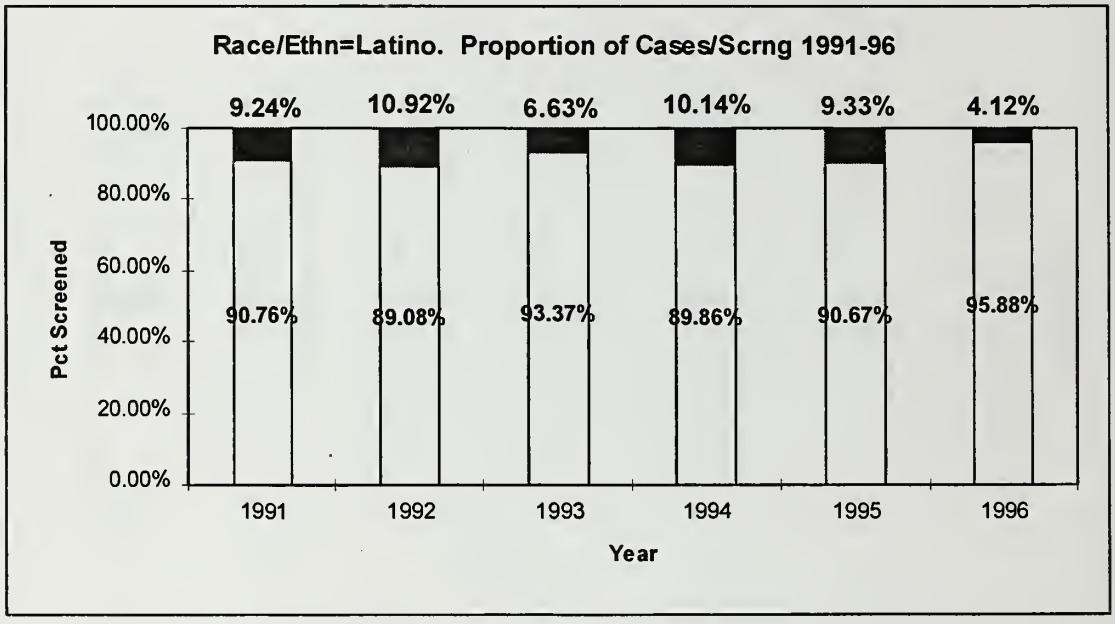

No. of African-American Cases/Screening 1991-96
Cases
Screening
No. Screened
800
700
600
500
400
300
200
100
0
10
138
10
285
11
198
10
186
18
86
8
76
1991
1992
1993
1994
1995
1996
Year


Race/Ethn=Black. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
6.76%
93.24%
3.39%
96.61%
5.26%
94.74%
5.10%
94.90%
17.31%
82.69%
9.52%
90.48%
1991
1992
1993
1994
1995
1996
Year

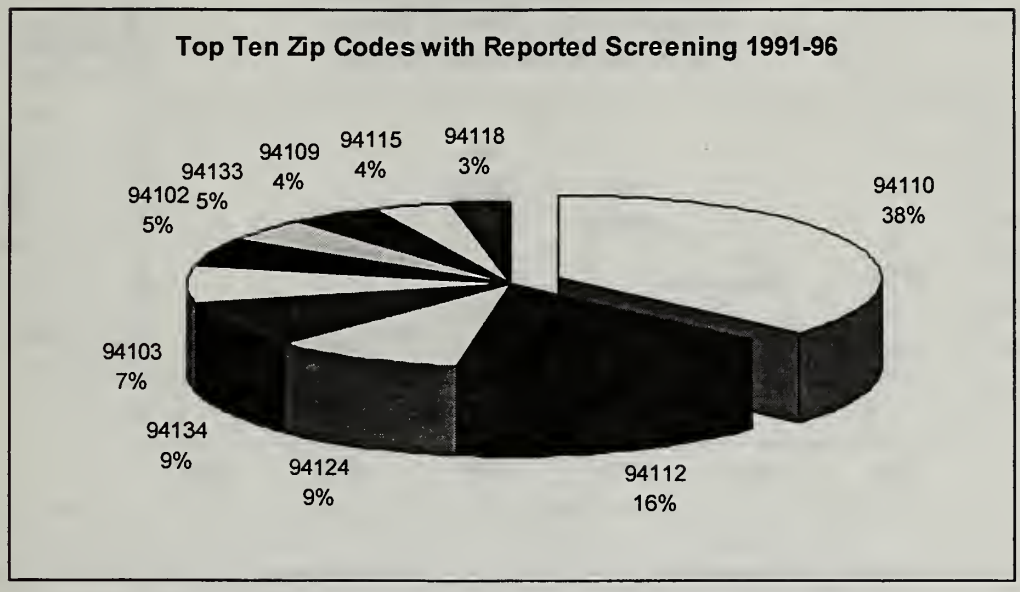

No. of Asian Cases/ Screening 1991-96
Cases
Screening
No. Screened
800
700
600
500
400
300
200
100
0
6
163
10
329
11
202
10
359
18
495
8
708
1991
1992
1993
1994
1995
1996
Year

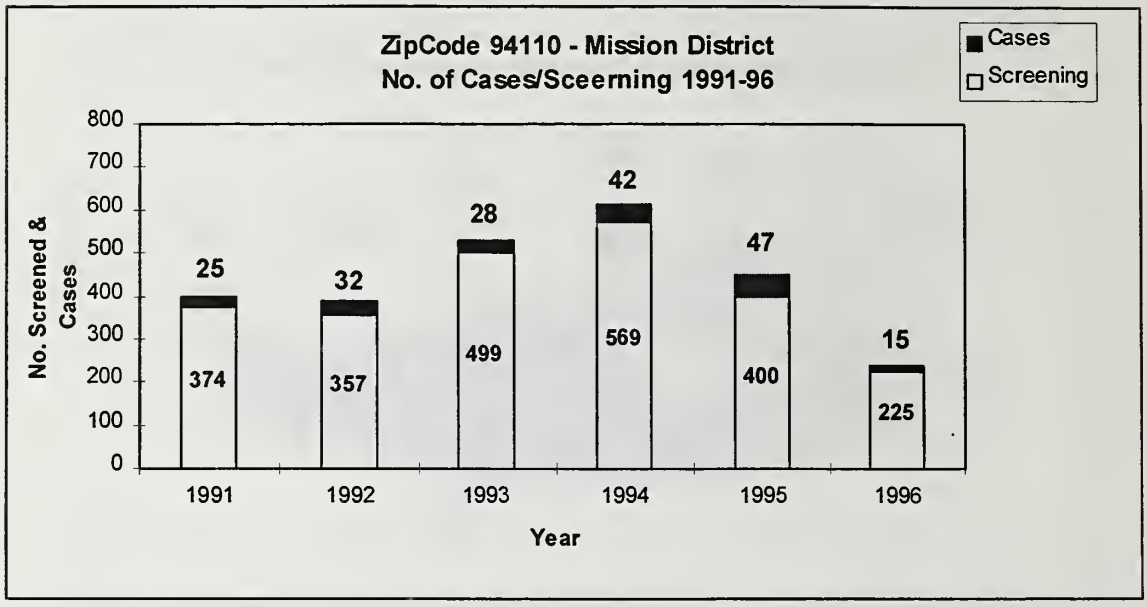

Race/Ethn=Asian. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
3.55%
96.45%
2.95%
97.05%
5.16%
94.84%
2.71%
97.29%
3.51%
96.49%
1.12%
98.88%
1991
1992
1993
1994
1995
1996
Year

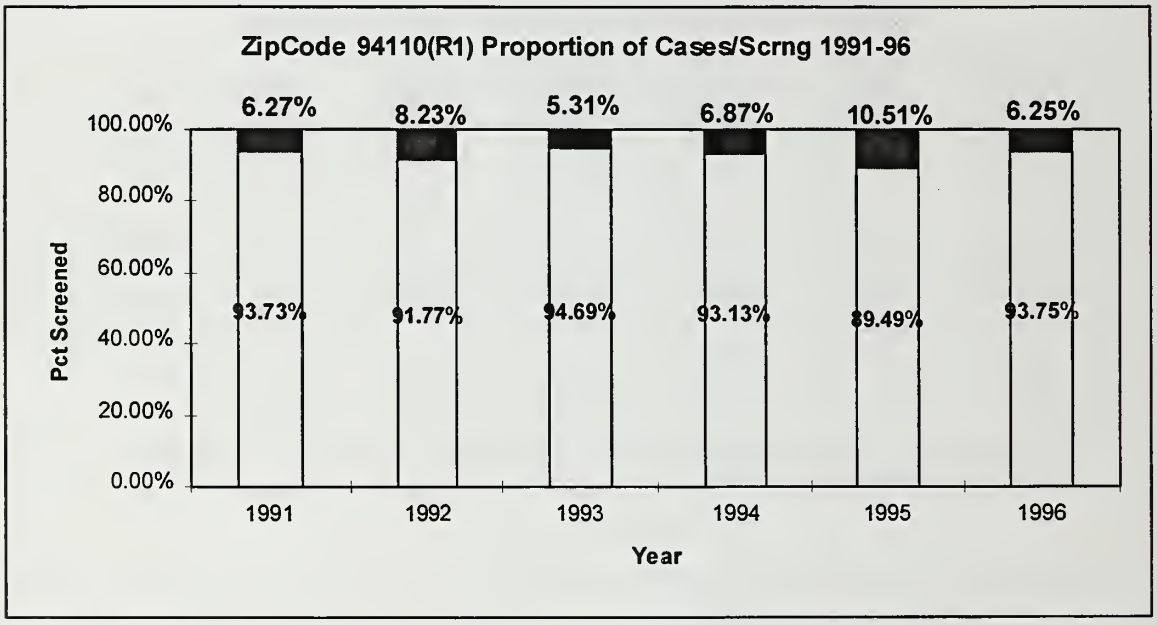

No. of Latino Cases/Screening 1991-96
Cases
Screening
No. Screened
800
700
600
500
400
300
200
100
0
28
50
37
65
54
24
275
408
521
576
525
558
1991
1992
1993
1994
1995
1996
Year

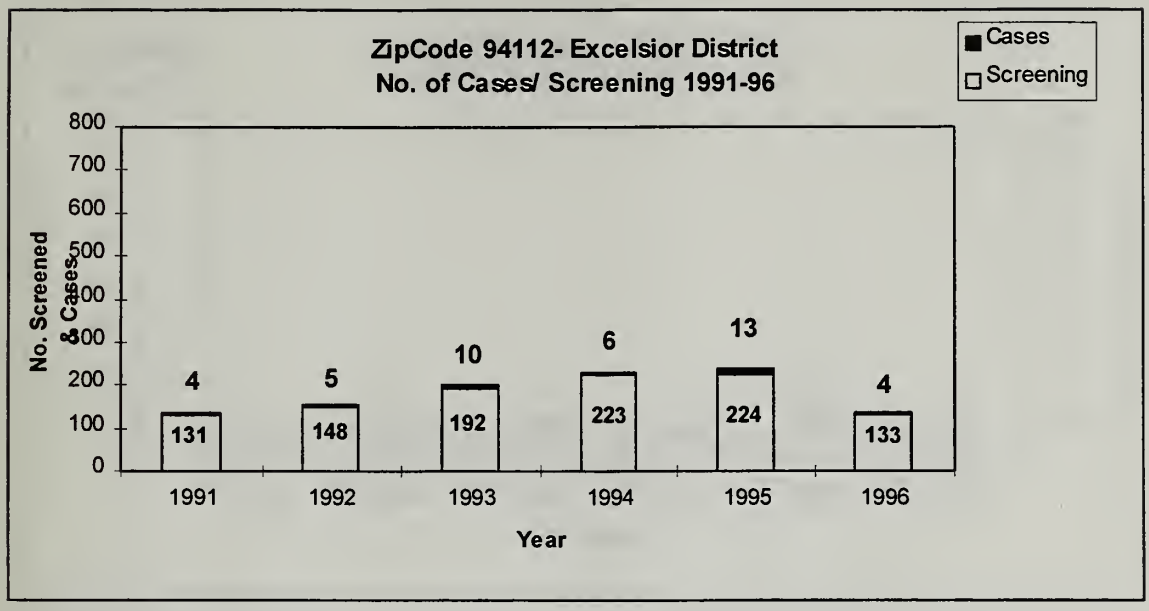

Race/Ethn=Latino. Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
9.24%
10.92%
6.63%
10.14%
9.33%
4.12%
90.76%
89.08%
93.37%
89.86%
90.67%
95.88%
1991
1992
1993
1994
1995
1996
Year

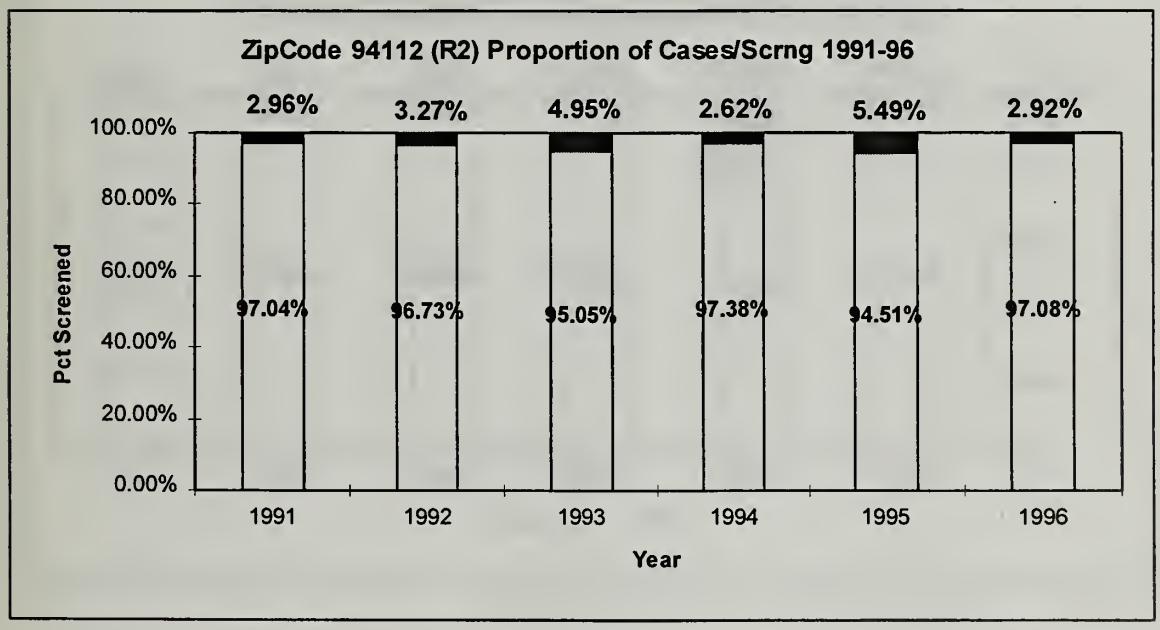
Zip Code Analysis

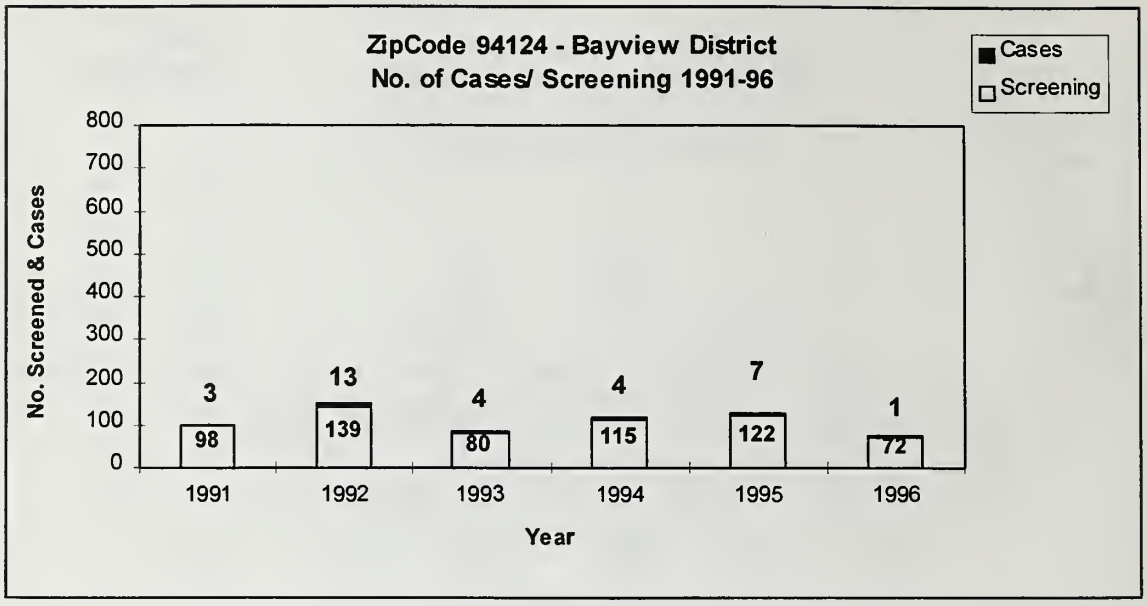


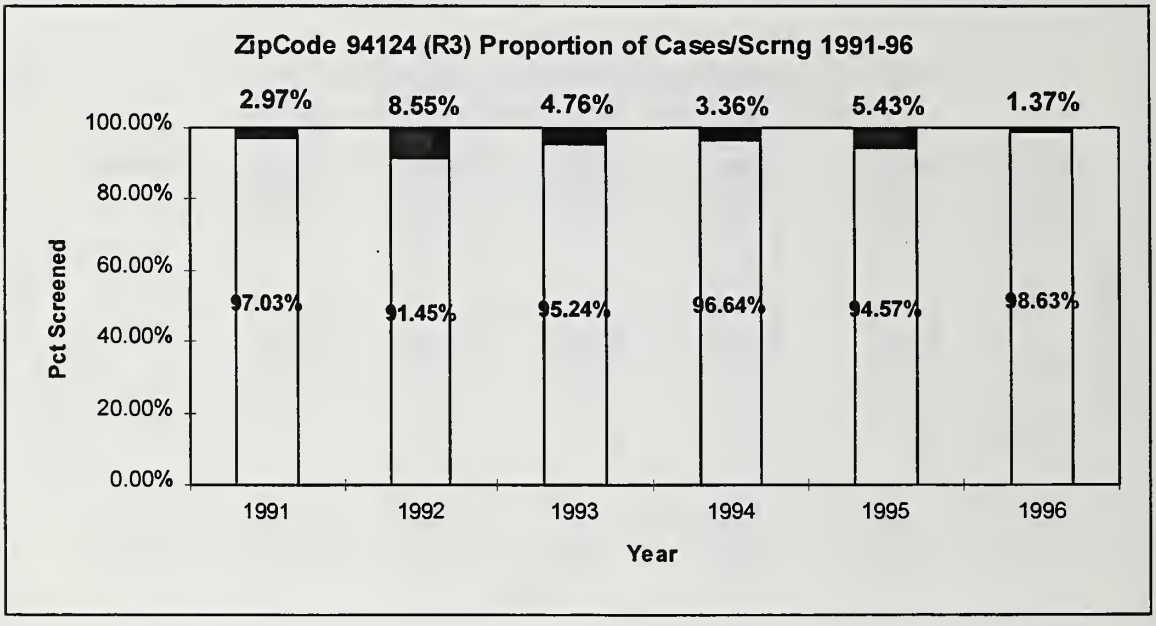

ZipCode 94110 - Mission District
No. of Cases/Sceerning 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
25
32
28
42
47
15
374
357
499
569
400
225
1991
1992
1993
1994
1995
1996
Year

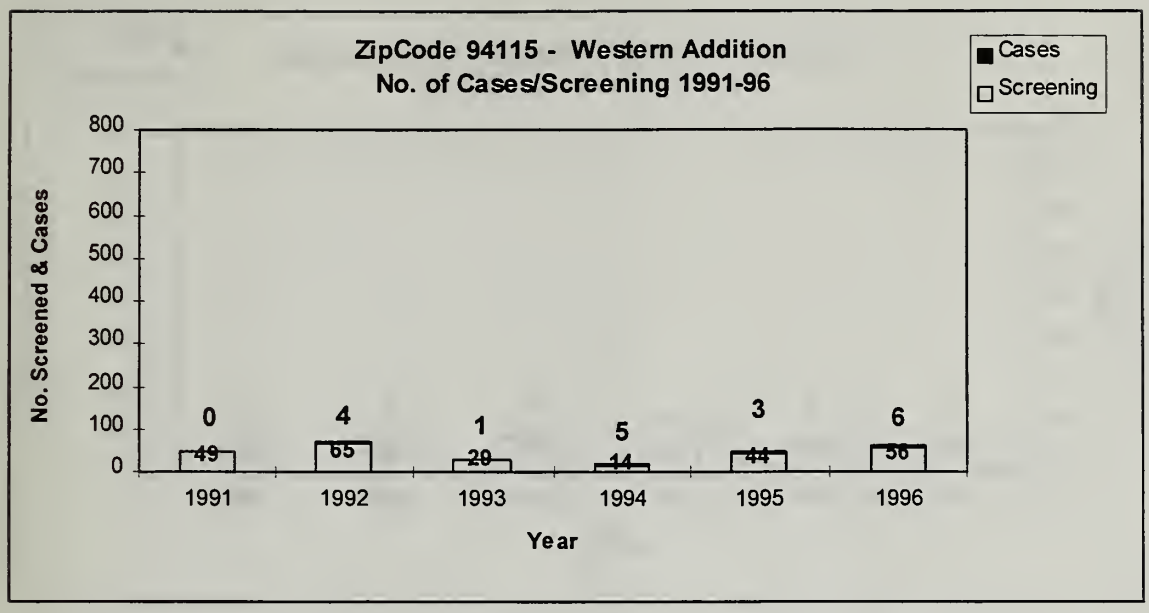

ZipCode 94110(R1) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
6.27%
8.23%
5.31%
6.87%
10.51%
6.25%
93.73%
91.77%
94.69%
93.13%
89.49%
93.75%
1991
1992
1993
1994
1995
1996
Year

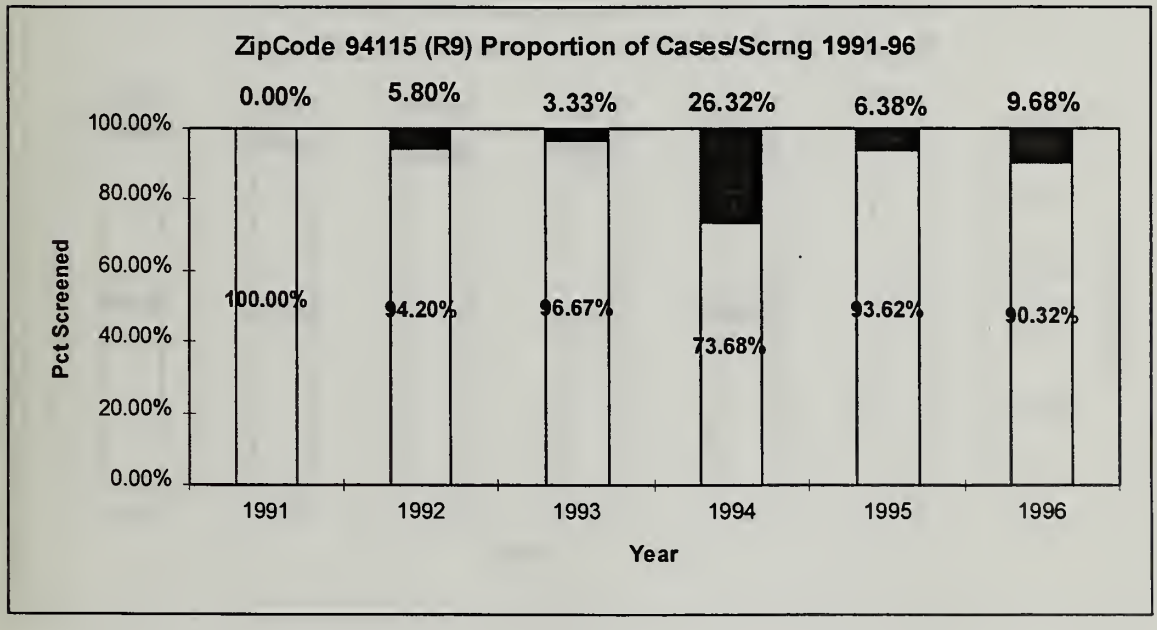

ZipCode 94112- Excelsior District
No. of Cases/ Screening 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
4
5
10
6
13
4
131
148
192
223
224
133
1991
1992
1993
1994
1995
1996
Year

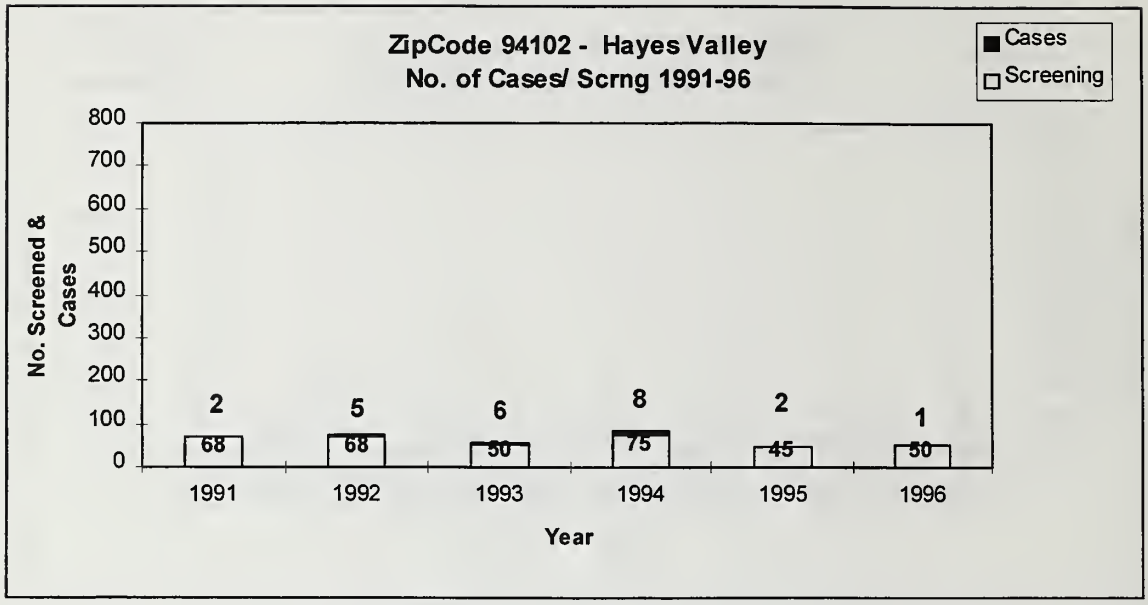

ZipCode 94112 (R2) Proportion of Cases/Scrng 1991-96
2.96%
3.27%
4.95%
2.62%
5.49%
2.92%
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
97.04%
96.73%
95.05%
97.38%
94.51%
97.08%
1991
1992
1993
1994
1995
1996
Year

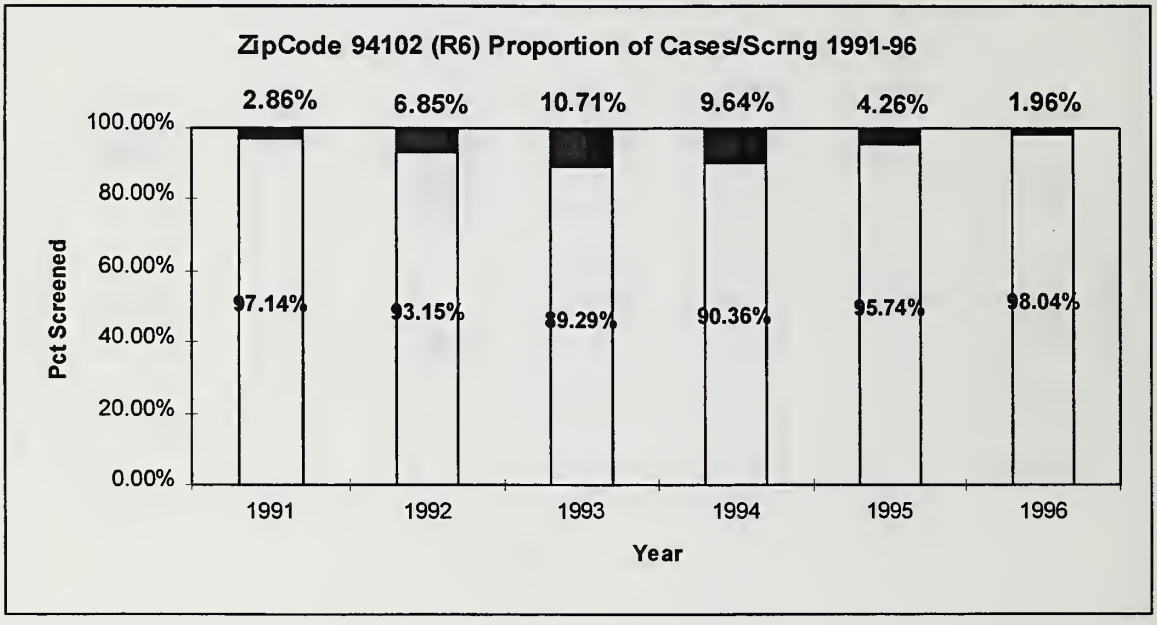

ZipCode 94124 - Bayview District
No. of Cases/ Screening 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
3
13
4
4
7
1
98
139
80
115
122
72
1991
1992
1993
1994
1995
1996
Year

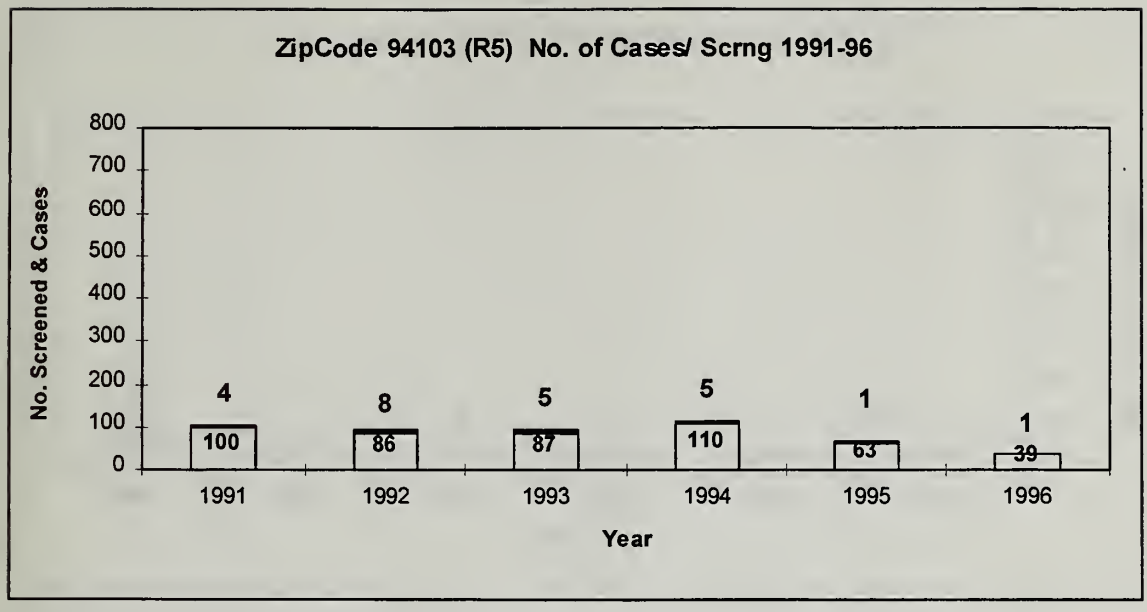

ZipCode 94124 (R3) Proportion of Cases/Scrng 1991-96
2.97%
8.55%
4.76%
3.36%
5.43%
1.37%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
Pct Screened
97.03%
91.45%
95.24%
96.64%
94.57%
98.63%
1991
1992
1993
1994
1995
1996
Year

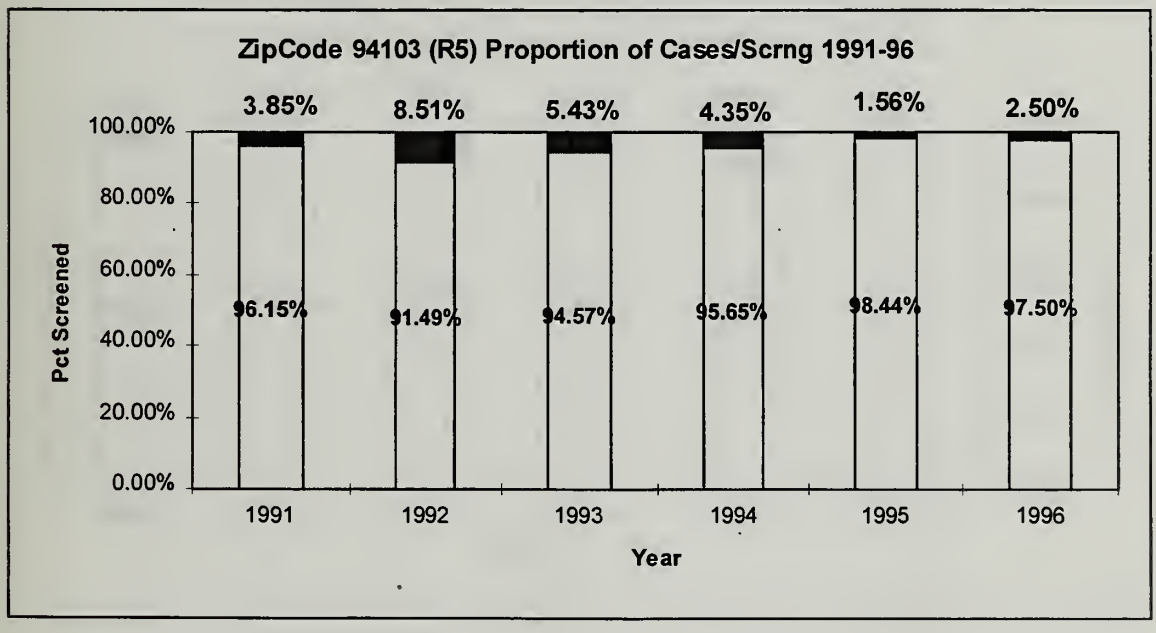

ZipCode 94115 - Western Addition
No. of Cases/Screening 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
0
4
1
5
3
6
49
65
20
14
44
56
1991
1992
1993
1994
1995
1996
Year

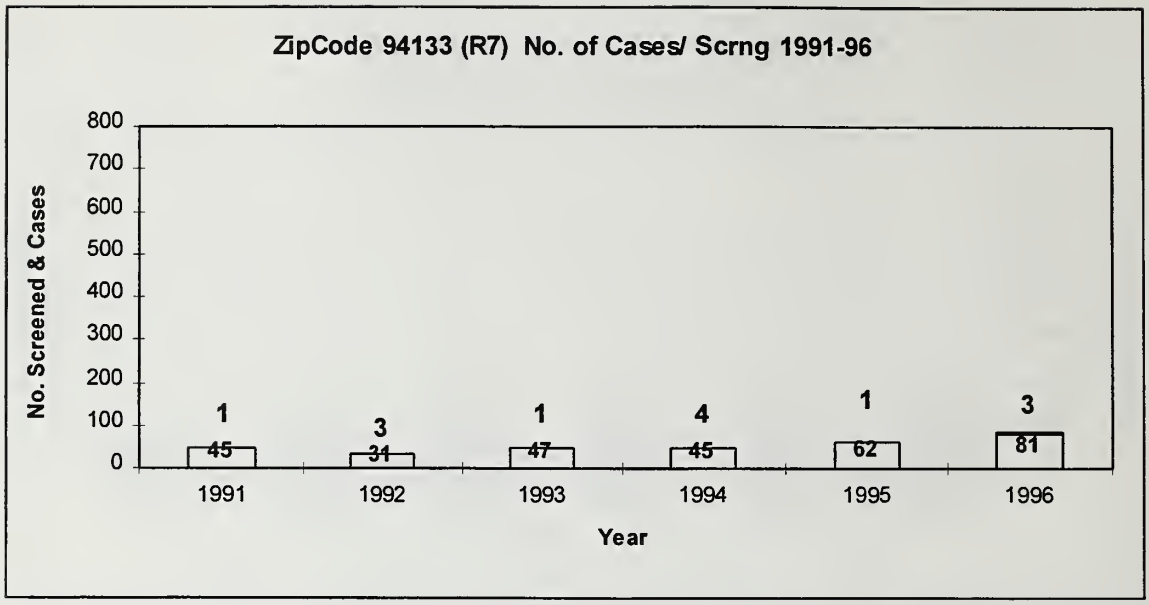

ZipCode 94115 (R9) Proportion of Cases/Scrng 1991-96
0.00%
5.80%
3.33%
26.32%
6.38%
9.68%
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
100.00%
94.20%
96.67%
73.68%
93.62%
90.32%
1991
1992
1993
1994
1995
1996
Year

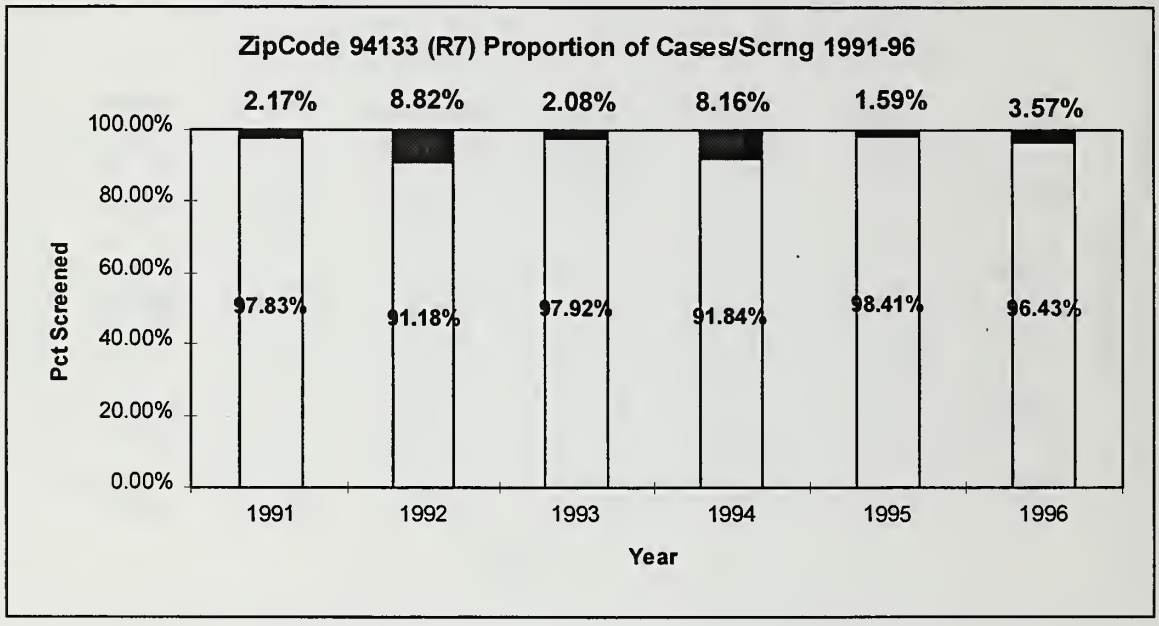

ZipCode 94102 - Hayes Valley
No. of Cases/ Scrng 1991-96
Cases
Screening
No. Screened & Cases
800
700
600
500
400
300
200
100
0
2
5
6
8
2
1
68
68
50
75
45
50
1991
1992
1993
1994
1995
1996
Year

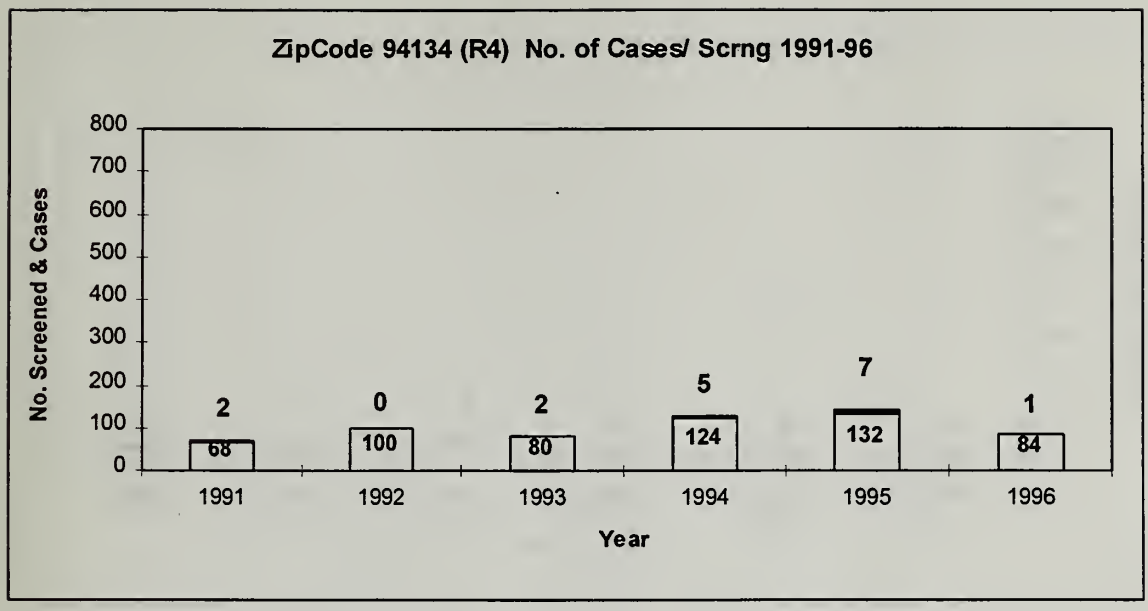

ZipCode 94102 (R6) Proportion of Cases/Scrng 1991-96
2.86%
6.85%
10.71%
9.64%
4.26%
1.96%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
Pct Screened
97.14%
93.15%
89.29%
90.36%
95.74%
98.04%
1991
1992
1993
1994
1995
1996
Year

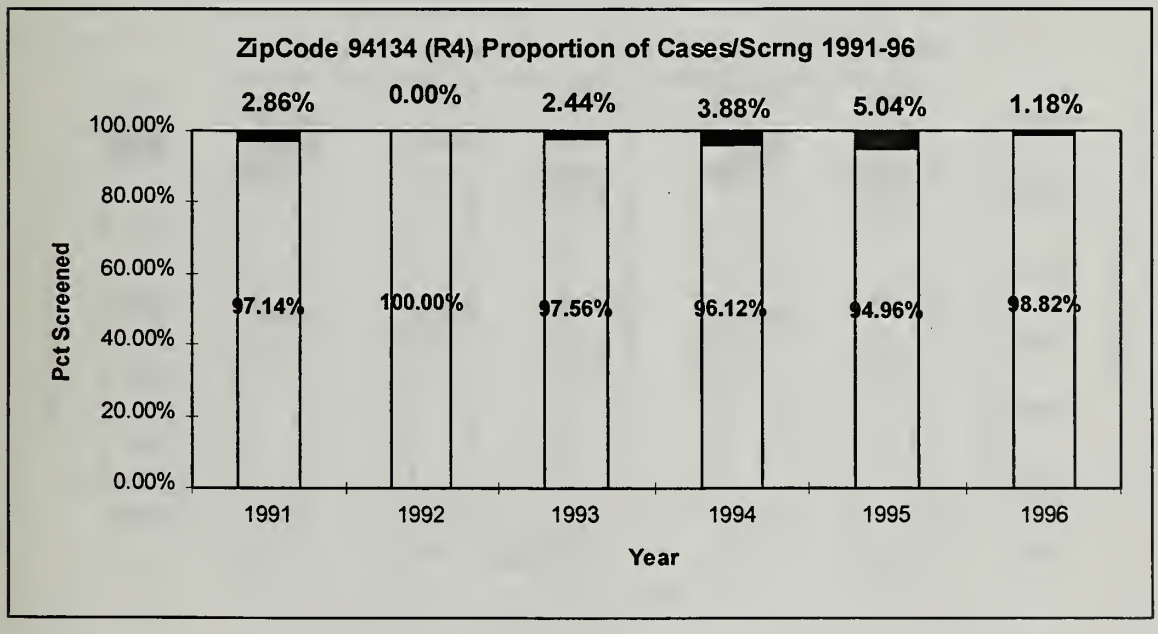

ZipCode 94103 (R5) No. of Cases/ Scrng 1991-96
No. Screened & Cases
800
700
600
500
400
300
200
100
0
4
8
5
5
1
1
100
86
87
110
63
39
1991
1992
1993
1994
1995
1996
Year

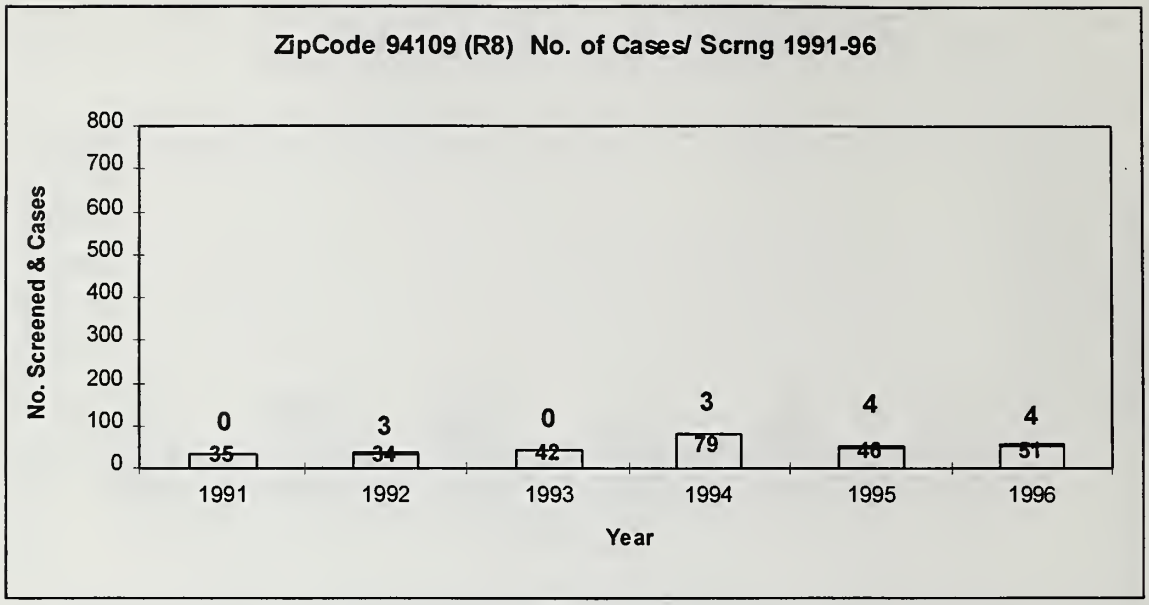

ZipCode 94103 (R5) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
3.85%
8.51%
5.43%
4.35%
1.56%
2.50%
96.15%
91.49%
94.57%
95.65%
98.44%
97.50%
1991
1992
1993
1994
1995
1996
Year

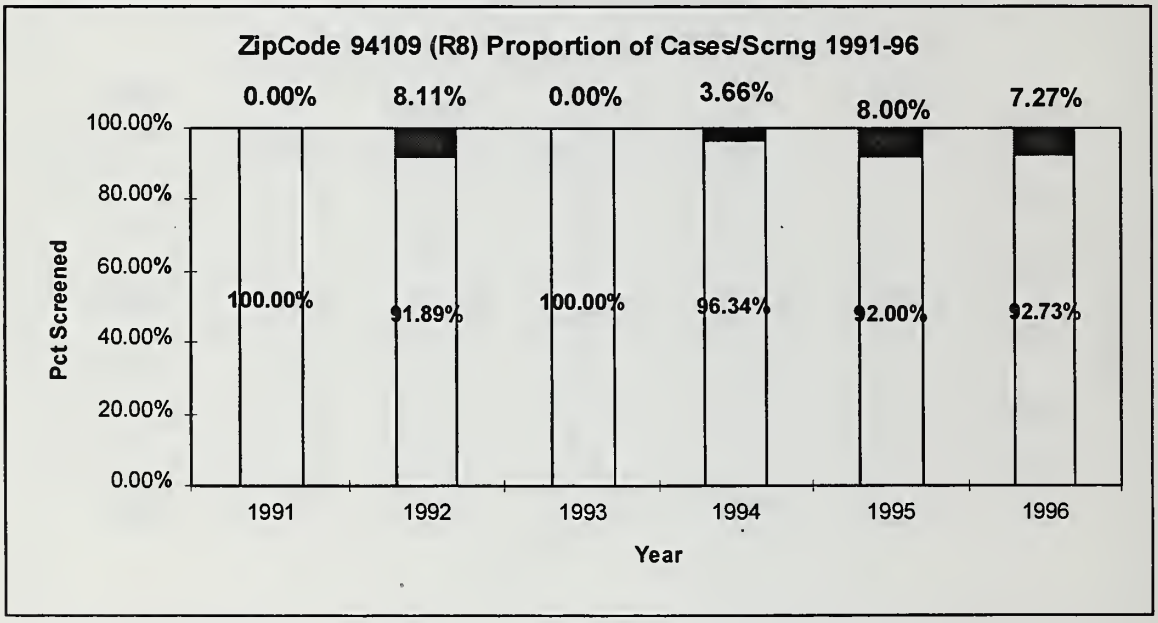

ZipCode 94133 (R7) No. of Cases/ Scrng 1991-96
No. Screened & Cases
800
700
600
500
400
300
200
100
0
1
45
3
31
1
47
4
45
1
62
3
81
1991
1992
1993
1994
1995
1996
Year

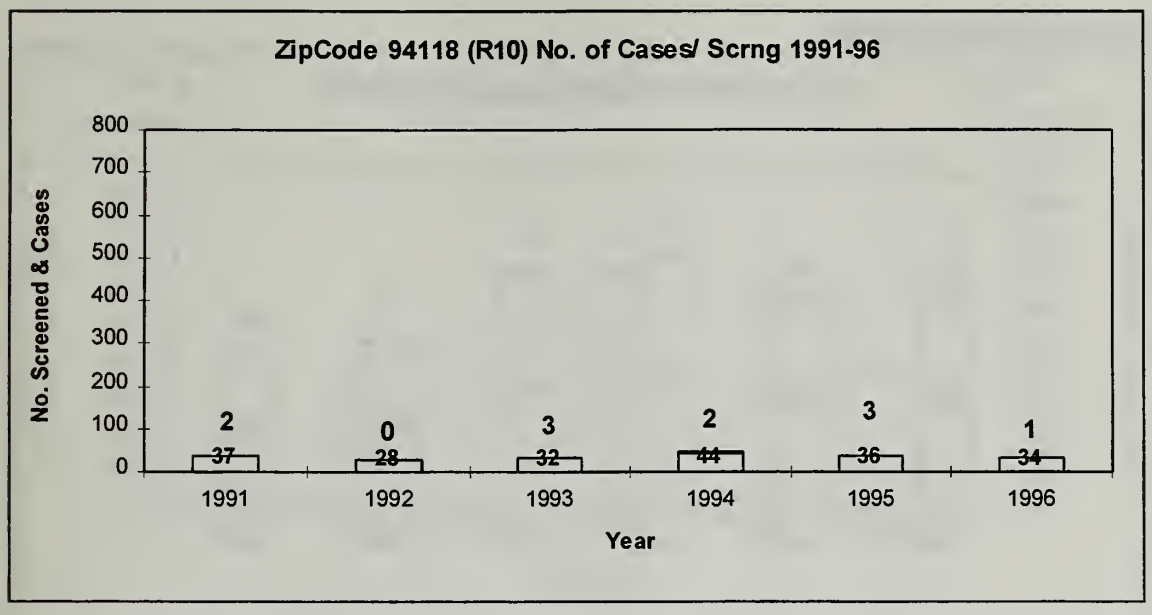

ZipCode 94133 (R7) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
2.17%
97.83%
8.82%
91.18%
2.08%
97.92%
8.16%
91.84%
1.59%
98.41%
3.57%
96.43%
1991
1992
1993
1994
1995
1996
Year

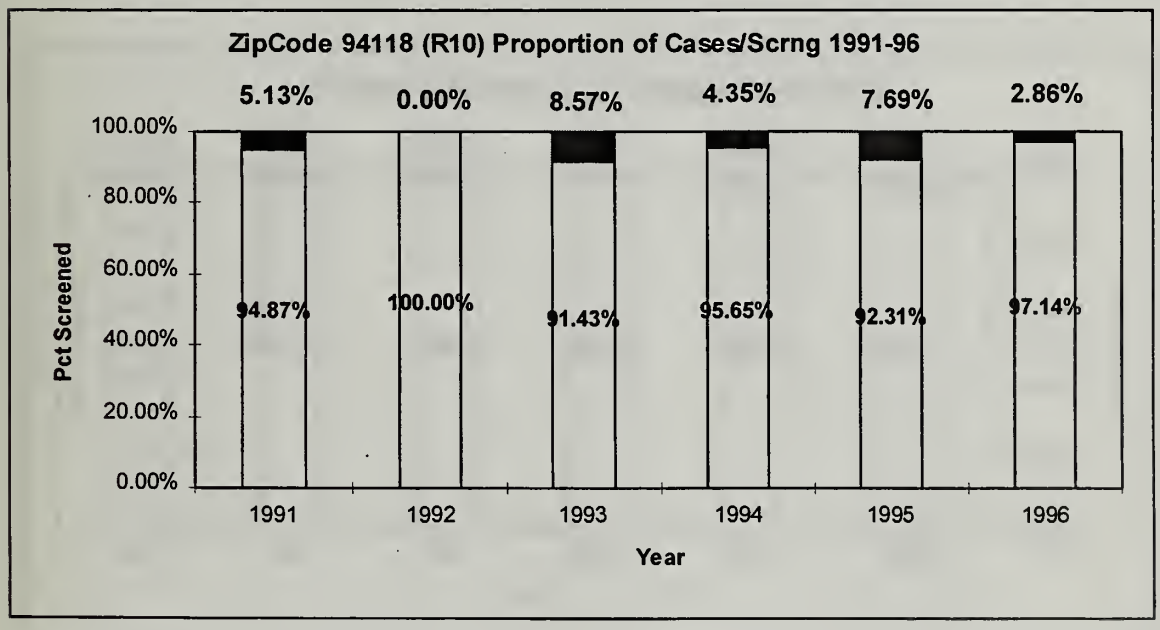

ZipCode 94134 (R4) No. of Cases/ Scrng 1991-96
No. Screened & Cases
800
700
600
500
400
300
200
100
0
2
0
2
5
7
1
68
100
80
124
132
84
1991
1992
1993
1994
1995
1996
Year


ZipCode 94134 (R4) Proportion of Cases/Scrng 1991-96
Pct Screened
2.86%
0.00%
2.44%
3.88%
5.04%
1.18%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
97.14%
100.00%
97.56%
96.12%
94.96%
98.82%
1991
1992
1993
1994
1995
1996
Year

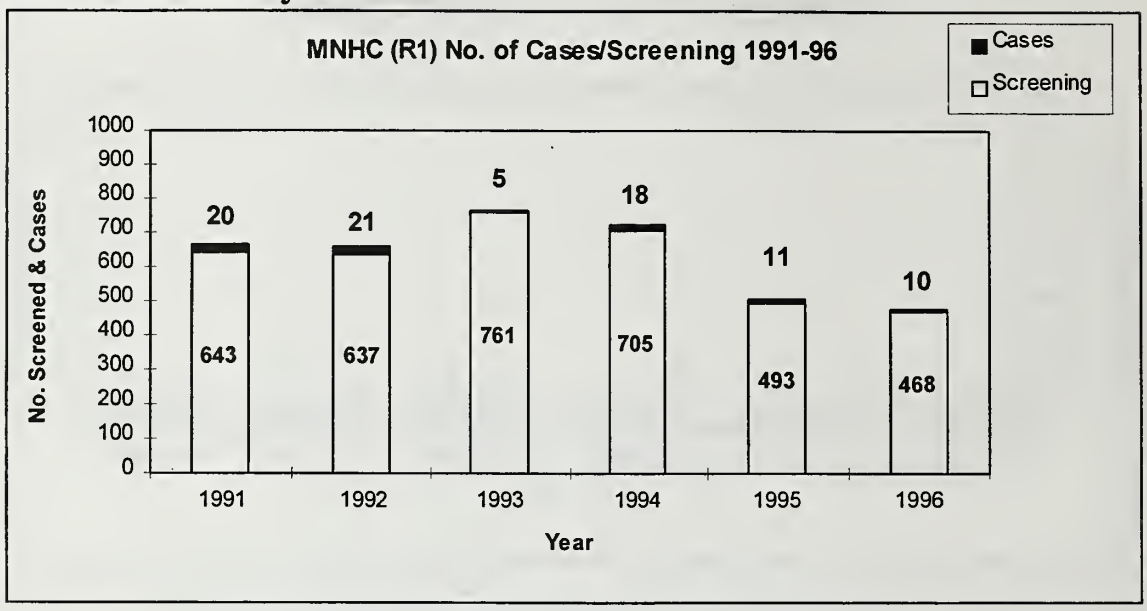

ZipCode 94109 (R8) No. of Cases/ Scrng 1991-96
No. Screened & Cases
800
700
600
500
400
300
200
100
0
0
3
0
3
4
4
35
34
42
79
46
51
1991
1992
1993
1994
1995
1996
Year

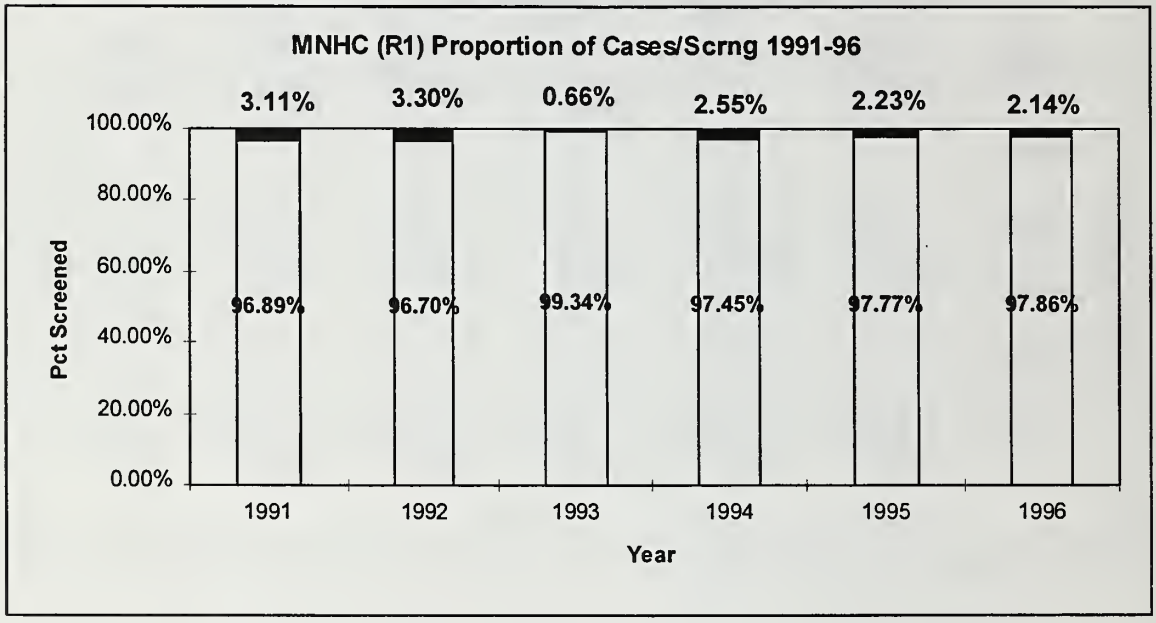

ZipCode 94109 (R8) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
8.11%
0.00%
3.66%
8.00%
7.27%
100.00%
91.89%
100.00%
96.34%
92.00%
92.73%
1991
1992
1993
1994
1995
1996
Year

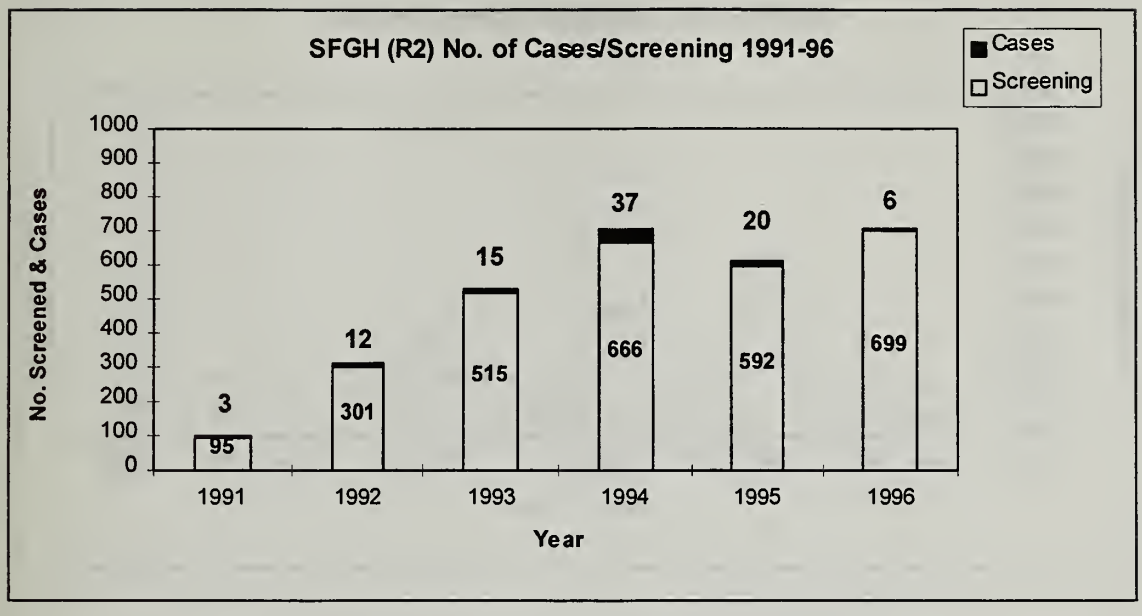

ZipCode 94118 (R10) No. of Cases/ Scrng 1991-96
No. Screened & Cases
800
700
600
500
400
300
200
100
0
2
37
0
28
3
32
2
44
3
36
1
34
1991
1992
1993
1994
1995
1996
Year

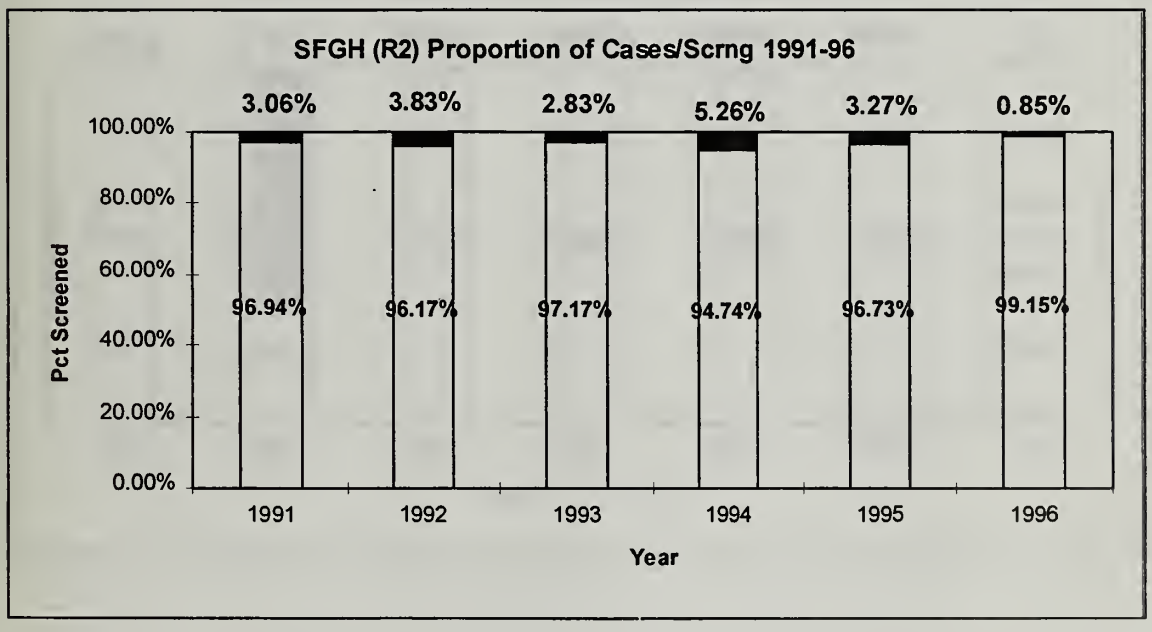

ZipCode 94118 (R10) Proportion of Cases/Scrng 1991-96
5.13%
0.00%
8.57%
4.35%
7.69%
2.86%
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
94.87%
100.00%
91.43%
95.65%
92.31%
97.14%
1991
1992
1993
1994
1995
1996
Year

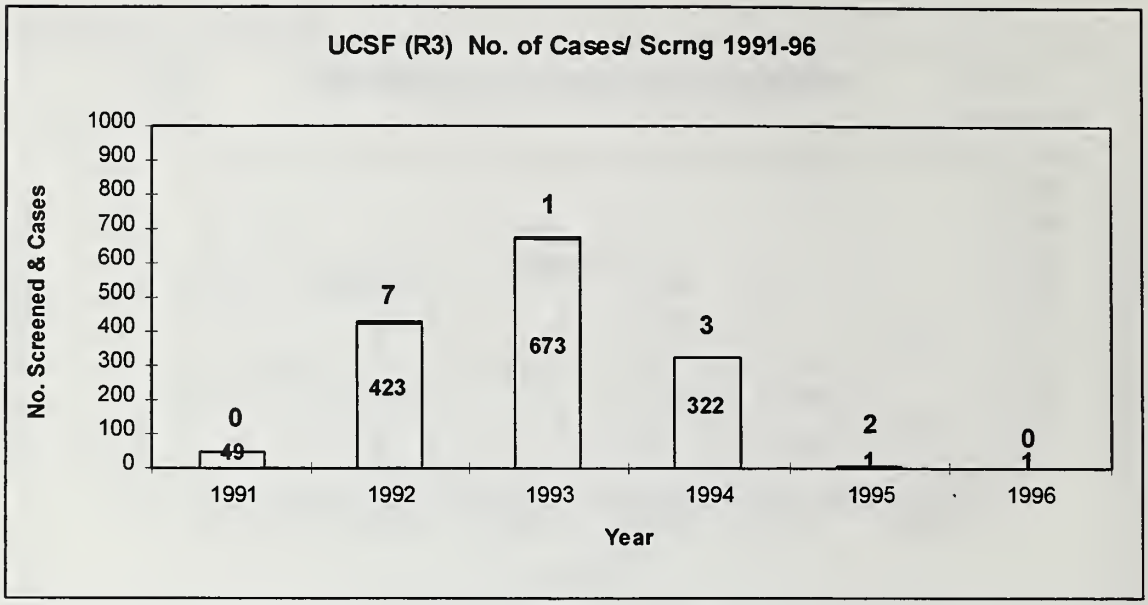
Institutional Analysis

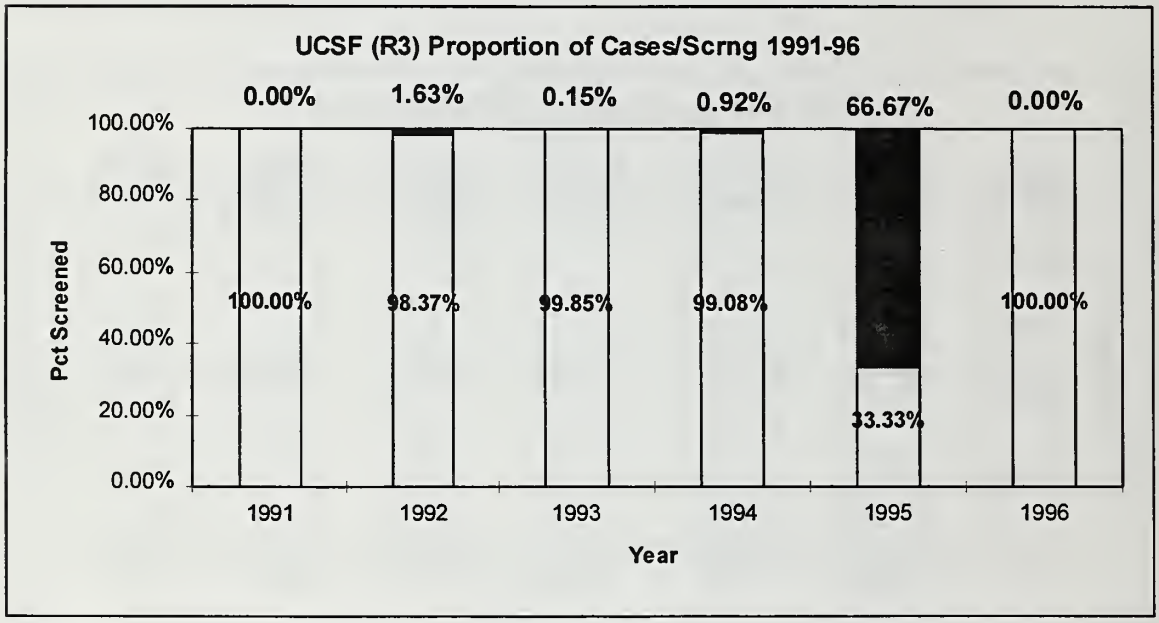


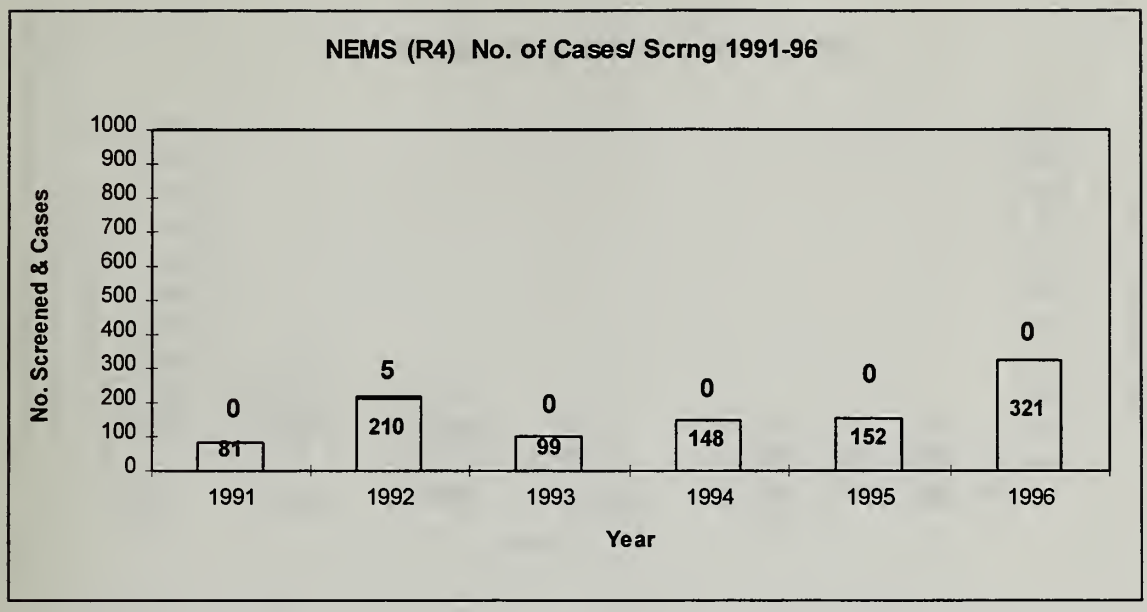


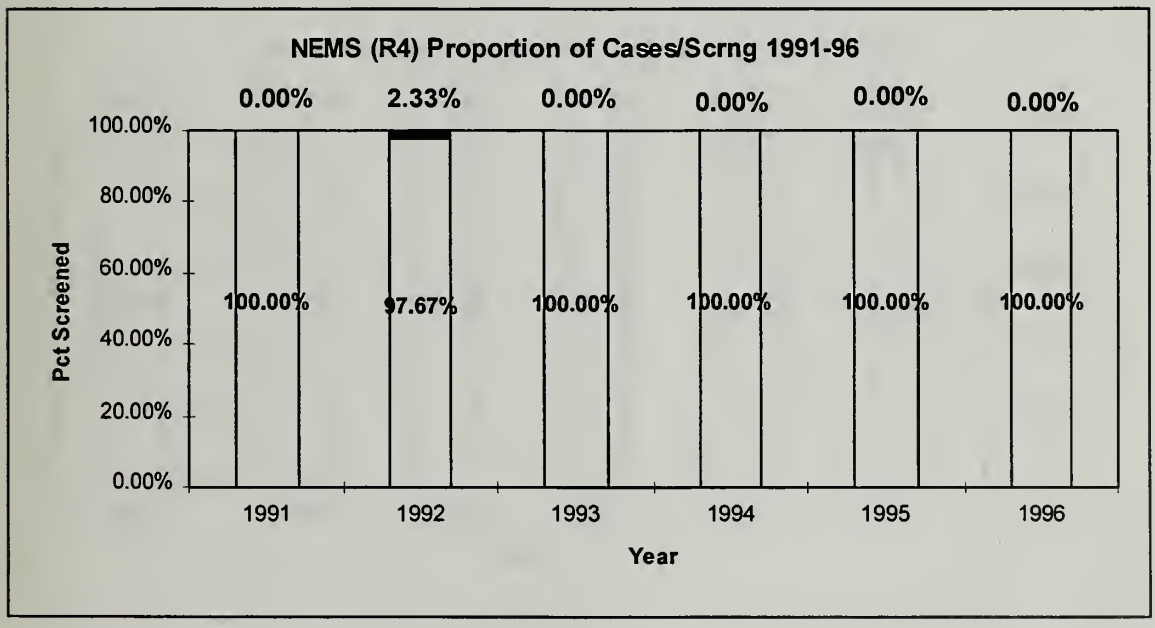

SFGH (R2) No. of Cases/Screening 1991-96
Cases
Screening
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
3
95
12
301
15
515
37
666
20
592
6
699
1991
1992
1993
1994
1995
1996
Year

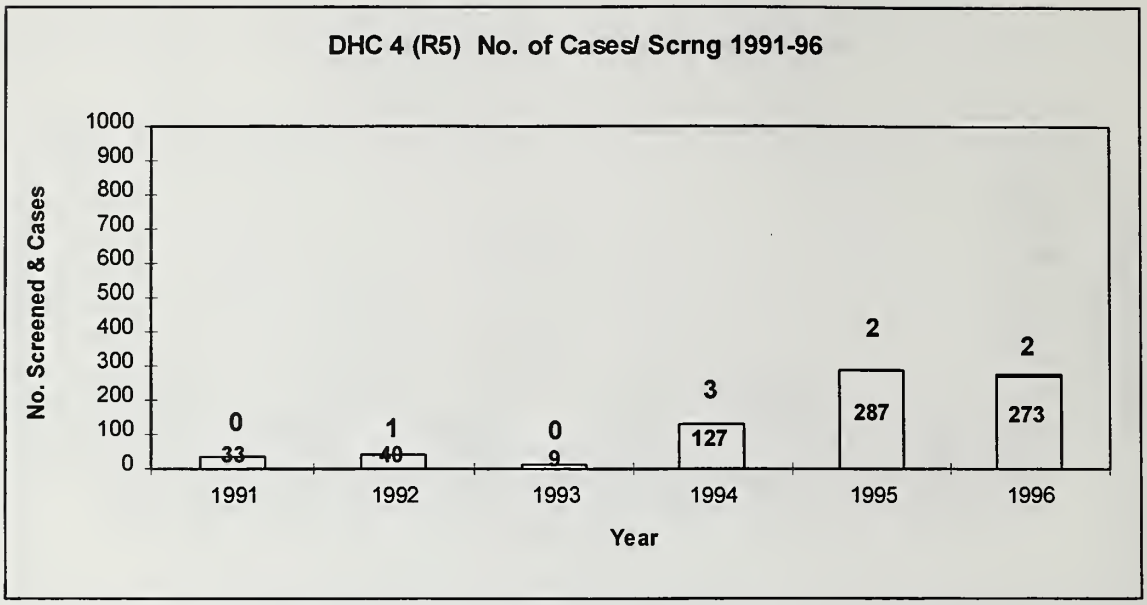

SFGH (R2) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
3.06%
96.94%
3.83%
96.17%
2.83%
97.17%
5.26%
94.74%
3.27%
96.73%
0.85%
99.15%
1991
1992
1993
1994
1995
1996
Year

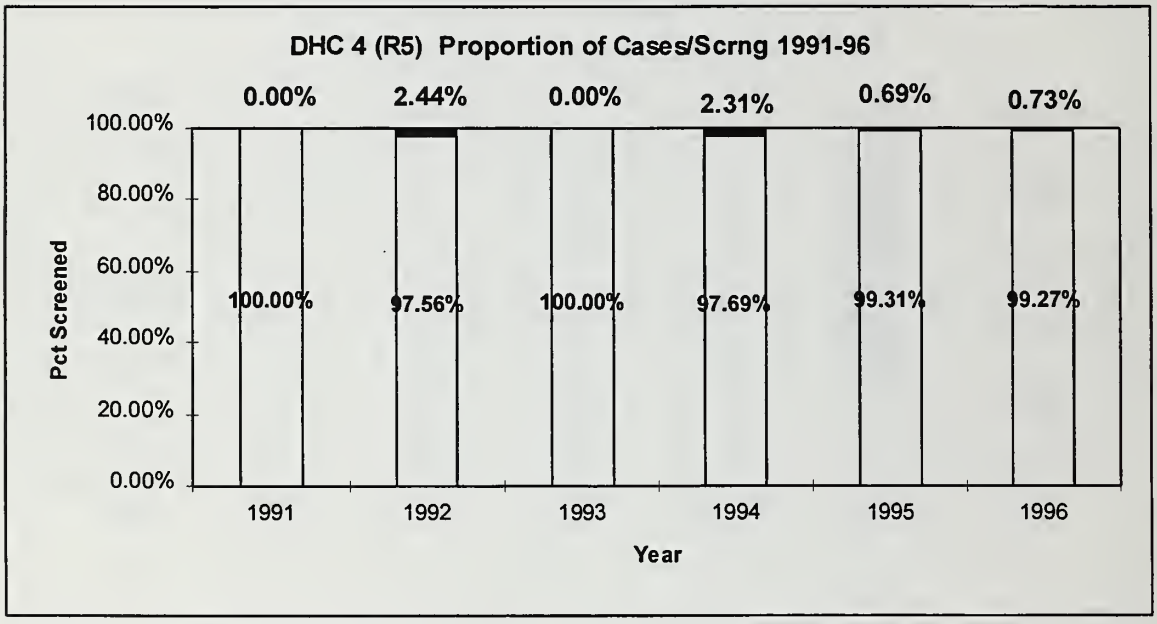

UCSF (R3) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
49
7
423
1
673
3
322
2
1
0
1
1991
1992
1993
1994
1995
1996
Year

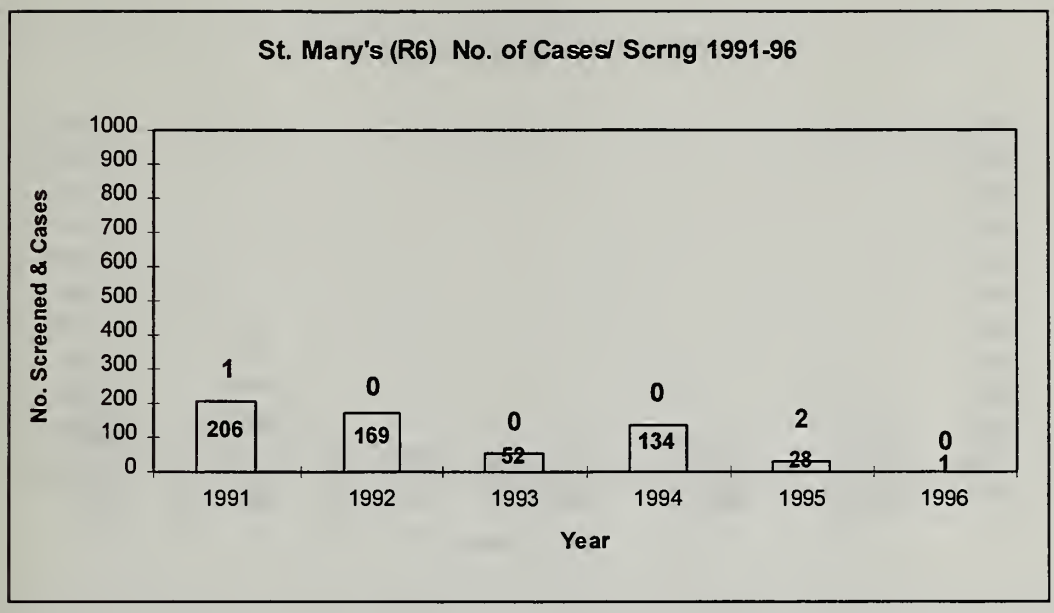

UCSF (R3) Proportion of Cases/Scrng 1991-96
0.00%
1.63%
0.15%
0.92%
66.67%
0.00%
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
100.00%
98.37%
99.85%
99.08%
33.33%
100.00%
1991
1992
1993
1994
1995
1996
Year

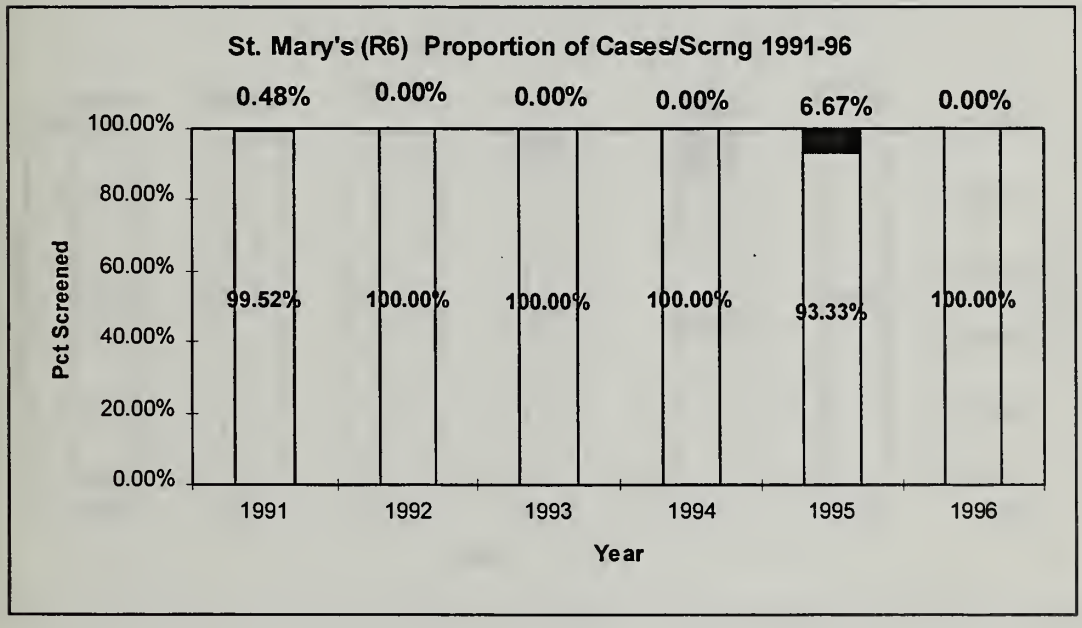

NEMS (R4) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
81
5
210
0
99
0
148
0
152
0
321
1991
1992
1993
1994
1995
1996
Year

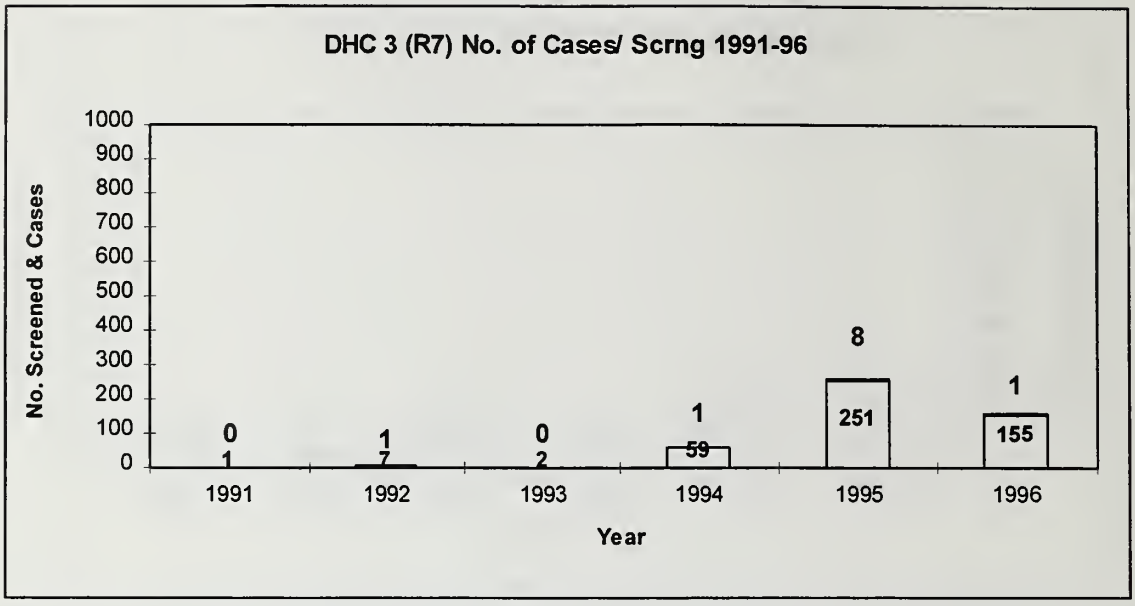

NEMS (R4) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
2.33%
0.00%
0.00%
0.00%
0.00%
100.00%
97.67%
100.00%
100.00%
100.00%
100.00%
1991
1992
1993
1994
1995
1996
Year

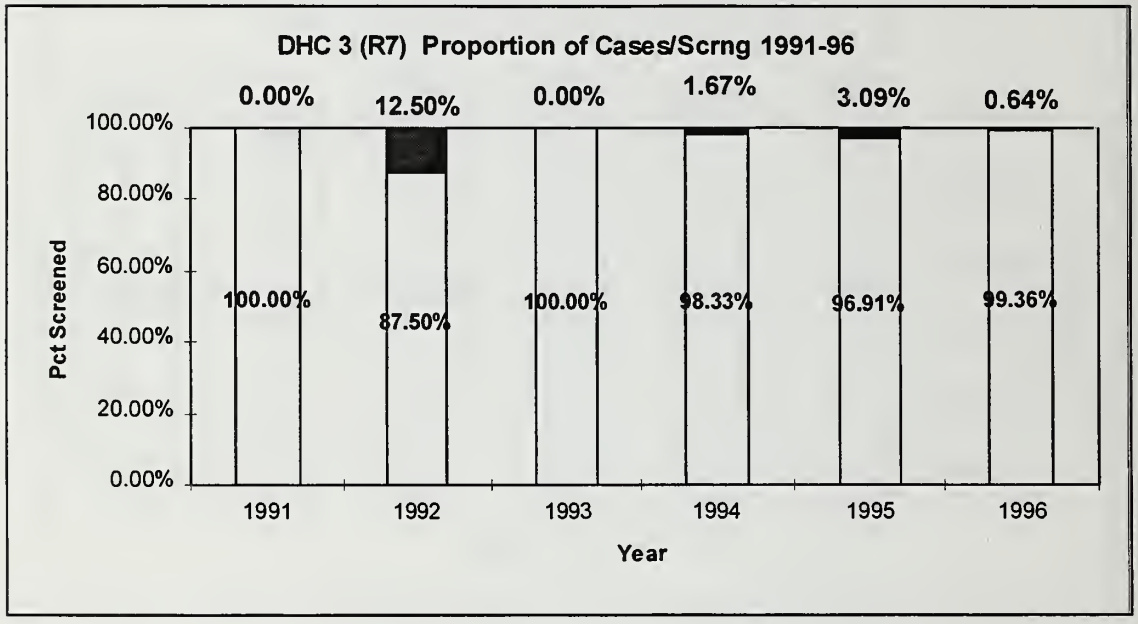

DHC 4 (R5) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
33
1
40
0
9
3
127
2
287
2
273
1991
1992
1993
1994
1995
1996
Year

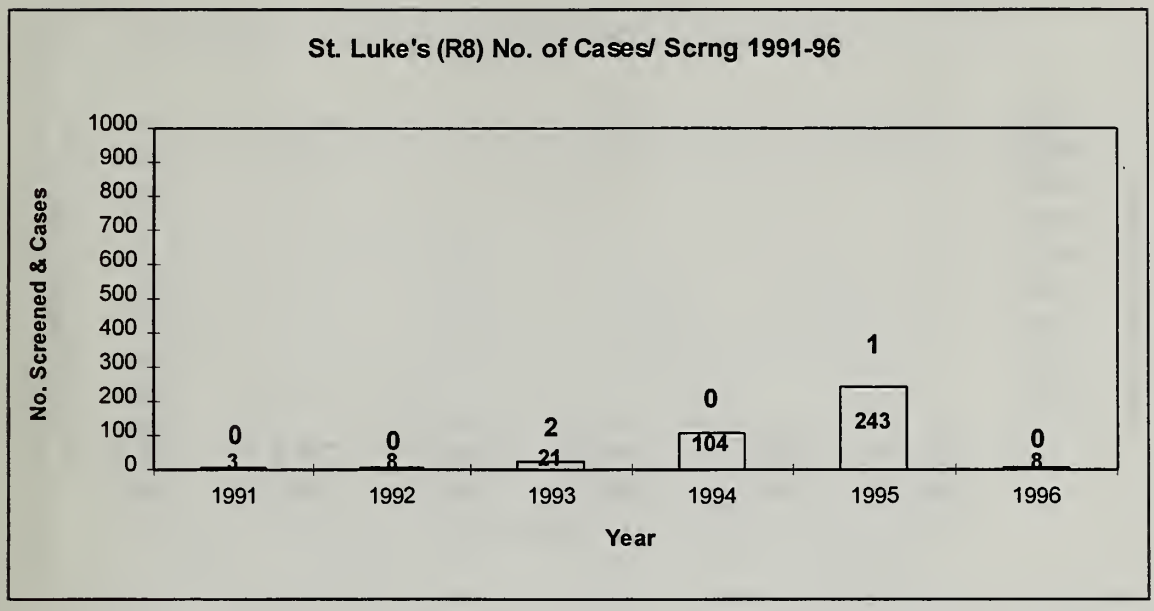

DHC 4 (R5) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
2.44%
0.00%
2.31%
0.69%
0.73%
100.00%
97.56%
100.00%
97.69%
99.31%
99.27%
1991
1992
1993
1994
1995
1996
Year

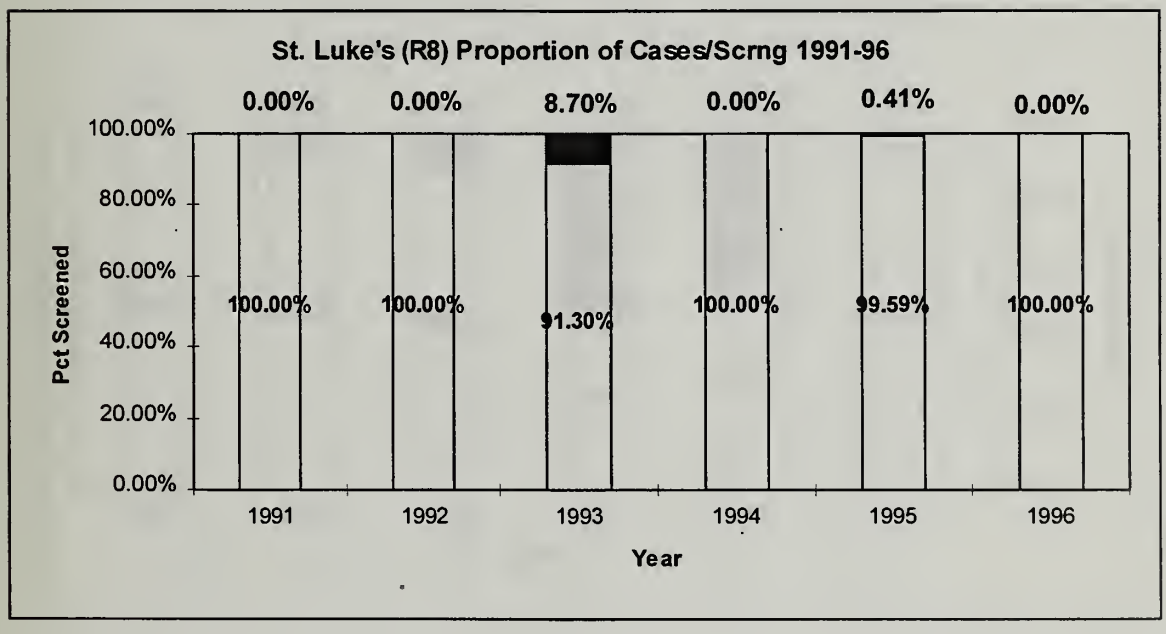

St. Mary's (R6) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
1
206
0
169
0
52
0
134
2
28
0
1
1991
1992
1993
1994
1995
1996
Year

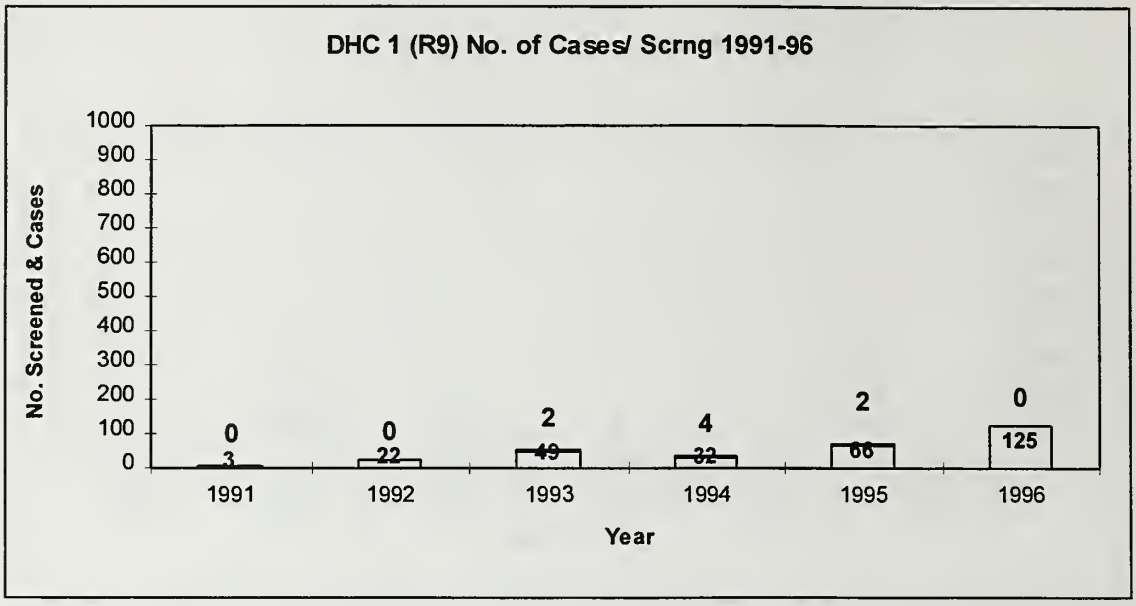

St. Mary's (R6) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.48%
0.00%
0.00%
0.00%
6.67%
0.00%
99.52%
100.00%
100.00%
100.00%
93.33%
100.00%
1991
1992
1993
1994
1995
1996
Year

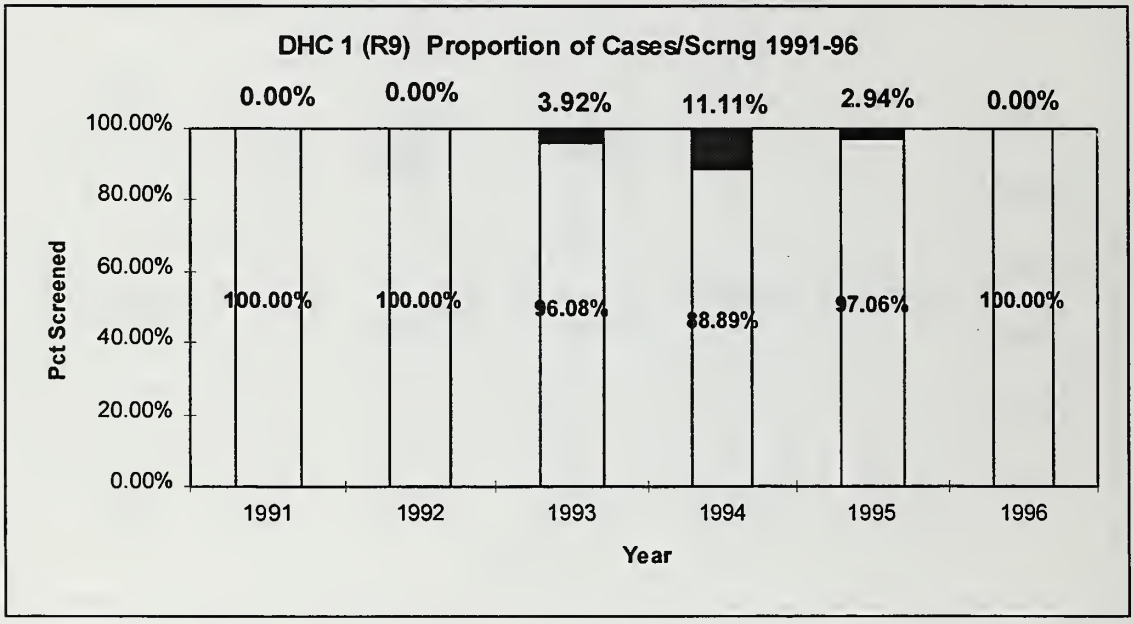

DHC 3 (R7) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
1
1
7
0
2
1
59
8
251
1
155
1991
1992
1993
1994
1995
1996
Year

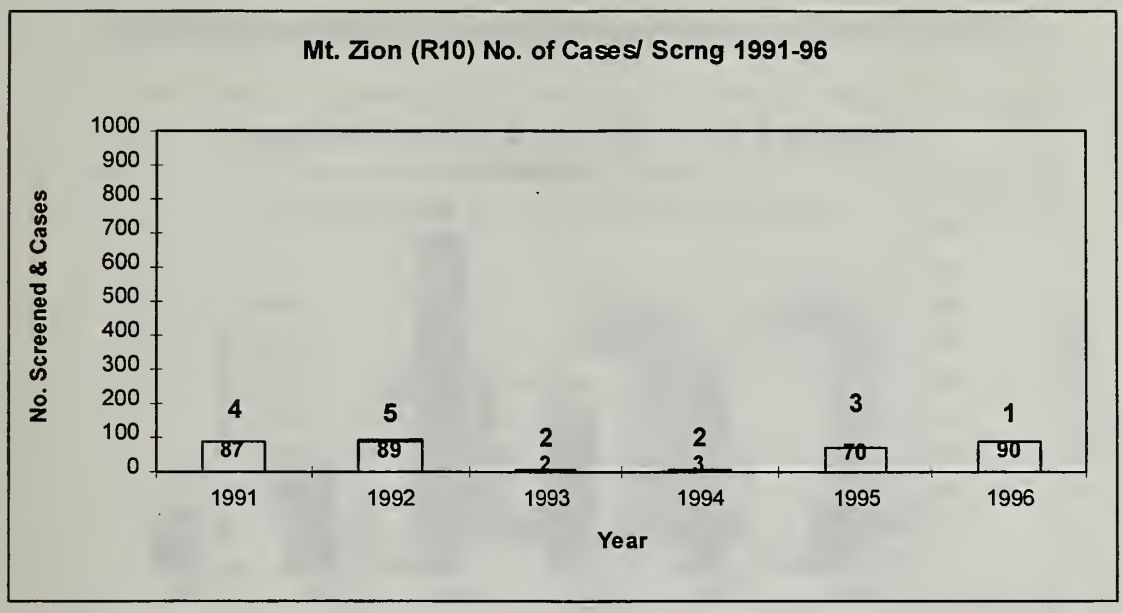

DHC 3 (R7) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
12.50%
0.00%
1.67%
3.09%
0.64%
100.00%
87.50%
100.00%
98.33%
96.91%
99.36%
1991
1992
1993
1994
1995
1996
Year

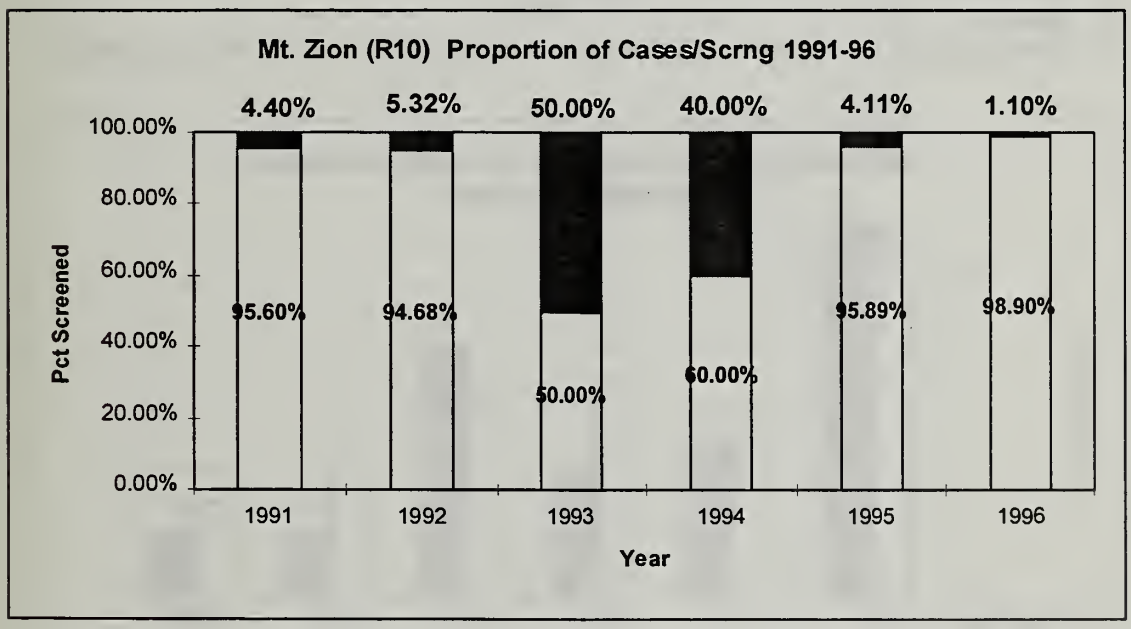

St. Luke's (R8) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
3
0
8
2
21
0
104
1
243
0
8
1991
1992
1993
1994
1995
1996
Year


St. Luke's (R8) Proportion of Cases/Scrng 1991-96
0.00%
0.00%
8.70%
0.00%
0.41%
0.00%
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
100.00%
100.00%
91.30%
100.00%
99.59%
100.00%
1991
1992
1993
1994
1995
1996
Year

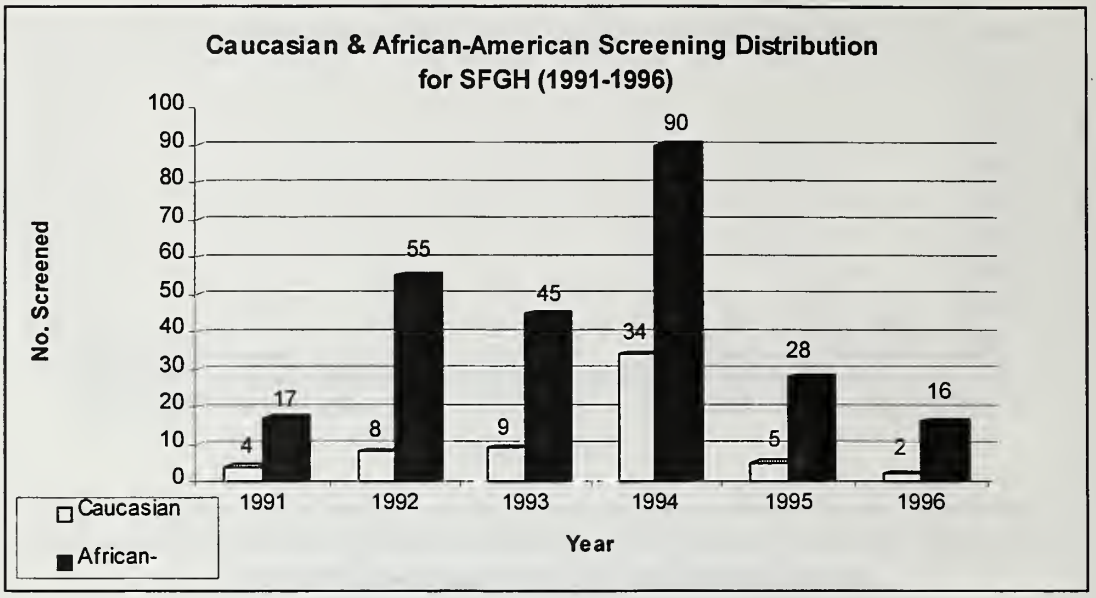

DHC 1 (R9) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
0
3
0
22
2
49
4
32
2
66
0
125
1991
1992
1993
1994
1995
1996
Year

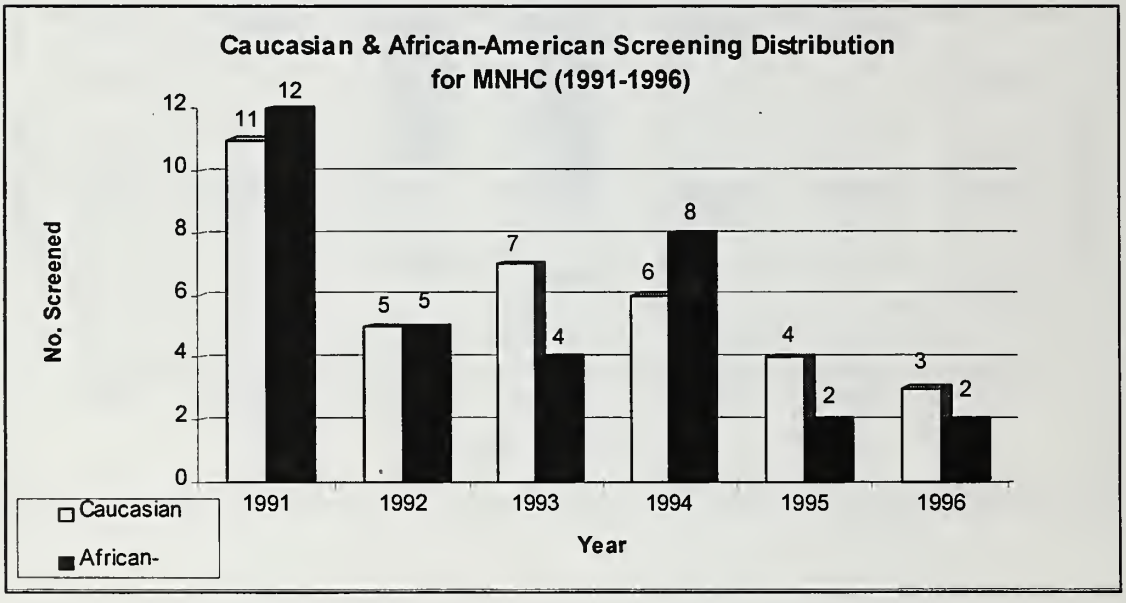
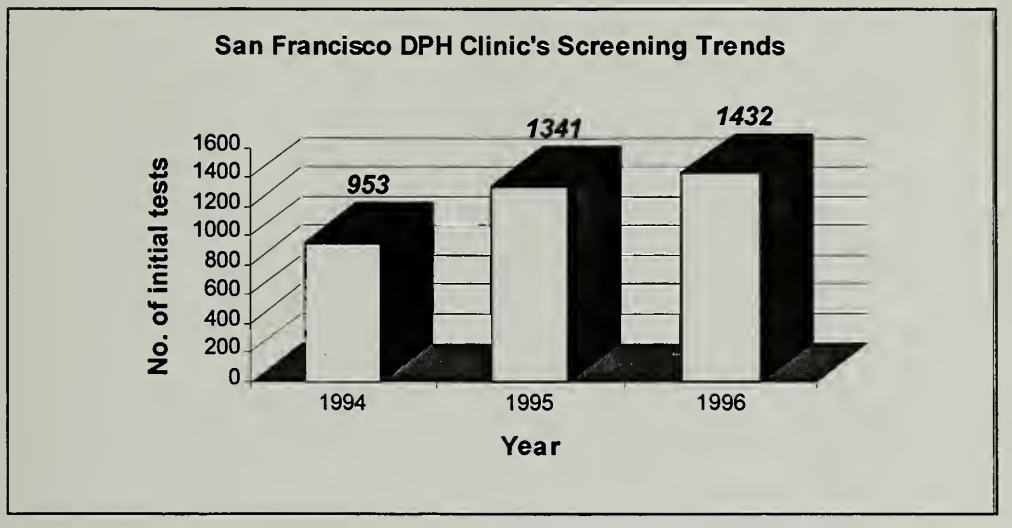

DHC 1 (R9) Proportion of Cases/Scrng 1991-96
Pct Screened
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
0.00%
0.00%
3.92%
11.11%
2.94%
0.00%
100.00%
100.00%
96.08%
88.89%
97.06%
100.00%
1991
1992
1993
1994
1995
1996
Year


Mt. Zion (R10) No. of Cases/ Scrng 1991-96
No. Screened & Cases
1000
900
800
700
600
500
400
300
200
100
0
4
5
2
2
3
1
87
89
2
3
70
90
1991
1992
1993
1994
1995
1996
Year


Mt. Zion (R10) Proportion of Cases/Scrng 1991-96
Pct Screened
4.40%
5.32%
50.00%
40.00%
4.11%
1.10%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
95.60%
94.68%
50.00%
60.00%
95.89%
98.90%
1991
1992
1993
1994
1995
1996
Year

Caucasian VS. African American at MNHC & SFGH





Screening Increase at Community Health Network Clinics